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U.S. Fuel Administration

Fuel facts...2d. ed. (Rev.)

[Washington]

[1918]

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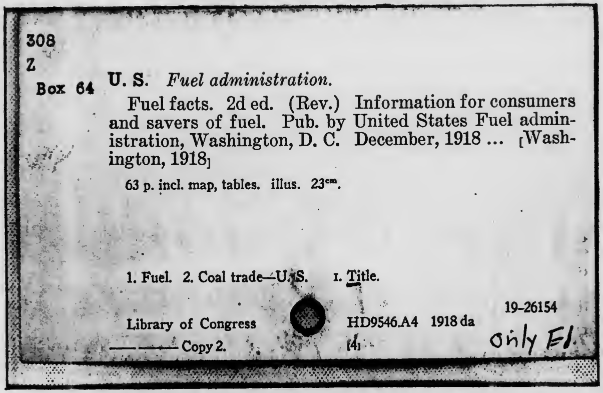

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FUEL FACTS

SECOND EDITION
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Information for Consumers and
SAVERS of Fuel

Published by
United States Fuel Administration
WASHINGTON, D. C.

~~OCTOBER, 1918~~
DECEMBER, 1918

Fuel Facts

SECOND EDITION
(*REVISED*)

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Published by
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Foreword

THE first edition of FUEL FACTS, issued in August, 1918, was compiled to supply in concrete and definite form the answers to questions propounded in letters written from all parts of the country calling for information on fuel affairs and concerning the methods of fuel control. After a few thousand copies had been sent into the various states, the Fuel Administration was flooded with requests for the pamphlet, which had fulfilled its purpose so well that early in October, it was decided to issue another edition, to meet the heavy demand. Certain mechanical troubles delayed the second edition, but several thousand had been bound, ready for delivery, when, at the time of the signing of the armistice, the presses were stopped. The wide demand for the pamphlet made it advisable to use the copies then printed in filling thousands of requests received.

This issue of FUEL FACTS is a revision of the second edition, to meet requests for the pamphlet still pouring in from all parts of the country.

The World's Fuel Problem

The United States, with more than half of the coal resources of the world, and with half of the present productive coal capacity of the world, now witnesses all civilization intent upon restoring the devastation of war on land; rebuilding the world's merchant navies; rehabilitating vast properties patriotically operated during the war with only the most vital repairs, and with energies bent toward new enterprises. The requirements of industry now loom higher than in any pre-war period, and practically all industry is dependent upon COAL.

Forty million tons of annual productive capacity in the coal mines of northern France, and Belgium are located in the territory which the struggling armies have fought over. Representatives of the Fuel Administration who have recently inspected some of the mines of northern France have reported that it will require from eight months to three years to restore pre-war production. The exact condition of the Belgian mines is as yet unknown.

The United States now has a coal producing organization which increased the country's output 140,000,000 tons from 1914 to 1917. During the eleven months of 1918 that have now passed, production has exceeded that of the same period of 1917 by about 40,000,000 net tons. At the rate the mines were producing up until early in October it was evident that by April 1, 1919, the records would have shown a 12 months' production of about 80,000,000 greater than that of any previous 12 months. Since the first week in October, production has fallen off as a result of the ravages of the influenza epidemic, and also as a result of the letting up of high tension of effort when the armistice with the central powers of Europe was announced.

The production of coal increased tremendously during June, July, August and September, of 1918. In fact, during the latter three months the output was nearly 25,000,000 tons in excess of that during the same period of the year before, which in turn had set a new record.

As railroad service improved, a heavy burden was laid upon the labor which must produce the coal. With ranks of mine labor depleted by the demand for active service in the fighting line, and by the movement of labor to more remunerative work in war industry, there developed the task of increasing the efficiency and output of the individual miner.

Through the loyal efforts of the individual mine workers and mine operators, the tremendous task was accomplished by enhancing the production of coal to the vast amount needed during the war period. They responded patriotically to numerous appeals, including those of President Wilson and General Pershing.

Great credit is due to those who did not spare themselves any labor or sacrifice to prevent waste of fuel and its products, and who thus did their utmost in furnishing the materials needed to complete the war program; to those who submitted willingly and wholeheartedly to the official suggestions and governmental regulation made necessary for the conservation and distribution of the enormous tonnage of fuel consumed in winning the war, and to the railroad employes and officials who handled the tremendously increased supply of fuel and the munitions it produced.

The solution of the world's war problem depended upon the solution of America's fuel problem. Fuel, the driving force of the war, had to be available in quantities sufficient to insure victory. Without fuel the vast and intricate machinery of war industry would have stopped; railroad and steamship traffic would have been clogged, and the steady progress of our armies would have been halted.

In a public statement, issued on September 6, 1917, just after his appointment by the President, Fuel Administrator Garfield said: "The task of the Fuel Administration is to secure the largest possible production of fuel at prices just to the producer and reasonable to the consumer."

The source of coal supply for the war requirements was within a limited area. The extra demands called for coal from the New River and Pocahontas low volatile fields of West Virginia, the low volatile fields of Pennsylvania and Maryland, and the high volatile fields of West Virginia, Pennsylvania and Kentucky.

These fields produce the grades of coal which were especially needed for the war work. The mines of these fields were kept working at top-notch speed and the railroads bent every effort to afford them a full car supply. The nation met the greatly increased demands for coal, not from the country's big coal pile, but from a much smaller pile, representing the output within a small area.

Importance of Oil as a Fuel

Next in importance to coal as fuel is petroleum, which is destined to become even more important in its relationship to the manufacturing world than heretofore. Of the many products of petroleum, fuel oil and gasoline are the two principal liquid fuels. Our dependency on gasoline is well understood, but the importance of fuel oil is not so widely appreciated.

Fuel oil as a steam-generating fuel has many advantages. An equal weight of fuel oil, as compared with coal, will give more heat, no smoke, require less man-power to handle it, and as a ship-fuel occupies much less bunker space.

The problem of increasing the supply of petroleum is one largely of transportation, which is being solved as new tank ships built by the Emergency Fleet Corporation are put into commission.

As to the permanency of supply, the amount in the ground is entirely problematical. Stocks of petroleum have been constantly decreasing since 1915, owing to enormously increased demand, but supplies from overseas and Mexico will greatly relieve the situation.

The United States Fuel Administration, which will be terminated automatically upon proclamation of peace, will pursue its course with that end in view, relinquishing its various activities as they become unnecessary under armistice conditions and continuing to function where its services still are required The vigorous and careful supervision of anthracite coal is an instance of the kind of work which ill must be done.

After a conference with Van H. Manning, Director of the Bureau of Mines, and Dr. George Otis Smith, Director of the Geological Survey, Fuel Administrator Harry A. Garfield announced on December 1, 1918, that the assimilation of some departments of the Fuel Administration would be begun soon by the two first named Government departments.

The Statistical Bureau of the Fuel Administration is to be taken over by the Geological Survey.

The work of the Conservation Bureau is to be taken over by the Bureau of Mines, which will continue the work of maintaining the quality of coal and improving processes of mining, which have been developed by the Fuel Administration.

The Bureau of Mines also will take over the engineering program of the Fuel Administration looking to the development of electrical power at, or close to, coal mines.

CREATION OF FUEL ADMINISTRATION

ON August 10, 1917, the President approved the law passed by Congress known as the Lever Act, which confers upon the President power to deal with the fuel situation. Acting under its authority, on August 21, he fixed a schedule of provisional prices at which bituminous coal not under contract should be sold and on August 23, in a similar way, he fixed prices for anthracite coal. On August 23 he appointed Harry A. Garfield United States Fuel Administrator.

An investigation of the coal industry had been conducted in 1917 by the Federal Trade Commission, pursuant to resolutions adopted by Congress, and on May 19 the Commission transmitted a preliminary report to the House of Representatives which pointed out that the underlying causes of the abnormal bituminous coal situation were:

> Increased demand for coal, shifting markets, inadequate transportation facilities, labor conditions, increased costs of production and distribution, lack of sufficient storage facilities, and speculative activities of some mine operators and brokers.

In a more detailed report on anthracite and bituminous coal, transmitted to the Senate on June 19, 1917 (Senate Doc. No. 70), the following recommendations were embodied:

> (1) That the production and distribution of coal and coke be conducted through a pool in the hands of a Government agency; that the producers of various grades of fuel be paid their full cost of production plus a uniform profit per ton (with due allowance for quality of product and efficiency of service).
>
> (2) That the transportation agencies of the United States, both rail and water, be similarly pooled and operated on Government account, under the direction of the President, and that all such means of transportation be operated as a unit, the owning corporations being paid a just and fair compensation which would cover normal net profit, upkeep and betterments.

The average price of bituminous coal during the year ending December 31, 1916, was from $1.25 to $1.50 per ton at the mines. During the latter part of that year prices advanced and continued to rise until during the summer of 1917 they reached $7.00 to $8.00 per ton for spot coal, with every prospect of continued advance.

Unequal distribution caused by competition for coal at any price, and consequent preference to those who could afford to pay, threatened to leave without fuel those who were not financially able or sufficiently influential to obtain a supply, thus creating a condition, as result of unbridled competition, of particular hardship to domestic consumers and of significant embarrassment in prosecution of the war.

Another feature manifested was the demand of labor to share in the increased profits resulting from higher prices and some advances had already been made. Then the Government assumed control.

LAST STAGE IN EXAMINATION OF BITUMINOUS COSTS

Coincident with the first anniversary of Mr. Garfield's incumbency of the position of United States Fuel Administrator, August 23, 1918, an order was signed by him that marked the last stage of an examination into cost of bituminous coal production in the various fields.

The coal fields of Alabama which were the last to be examined, presented some of the most difficult problems which the Engineers' committee of the Fuel Administration was required to handle. This was due to the fact that there are no clearly defined fields. Rather the coal measures overlap each other and must be determined by seams. The order announced a complete re-classification of the mining fields of Alabama and fixed the mine prices within reach of the fields.

With the completion of the examination of mining costs one of the most serious as well as one of the most difficult phases of the work of the Fuel Administration was accomplished. An idea of the size of the task may be gathered from the fact that there are approximately seven thousand five hundred coal operators in the United States and under the law each is required to furnish the Federal Trade Commission with monthly cost sheets.

When the President, in August, 1917, announced the Government control of fuel and the formation of the Fuel Administration, comparatively little information was at hand relative to the cost of production. Prices were announced, based on such information as had been obtained by the Federal Trade Commission and Geological Survey.

In January, 1918, a definite policy for adjusting production costs had been completed and the matter of adjusting prices to costs was undertaken by a committee composed of Cyrus Garnsey, Jr. (who has since become Assistant Fuel Administrator), R. V. Norris and James H. Allport.

FIXING OF MINE PRICES

While our coal resources are plentiful and a generous supply could be brought to the mouth of mines with the labor available, when transportation is clogged this becomes a limiting factor, because coal cannot be called produced until it is delivered. The aim of the Fuel Administration is, therefore, to bring to the mouth of the mine the best coal obtainable in such quantities as the railways can transport.

To accomplish this result prices have been so fixed as to offer a fair profit to reasonably efficient operators who are working veins of merchantable coal, without encouraging development or operation of mines that produce inferior coal or that operate only at high cost.

Before undertaking a revision of prices, the Fuel Administration makes inquiries and obtains detailed statements under oath by the operators on standard forms known as cost sheets, together with a thorough investigation by agents of the Fuel Administration not only with reference to the data submitted, but also covering general conditions in the field as to quality of coal, labor and transportation. This insures only such revisions in price as will tend toward an efficient use of the available mine labor in the production of those grades of coal most in demand at points where it can readily be transported to consumers. The quality of the coal produced or the location of a coal field or even of a single mine where costs are exceptionally high may justify granting a special price.

HOW MAXIMUM RETAIL PRICES ARE ESTABLISHED

To supplement the prices of coal at the mines, the Fuel Administration has issued regulations governing the maximum retail gross margins that may be charged by retail coal dealers. The local fuel committee for each community ascertains, after a careful investigation of the retailer's cost of conducting his business, what it considers to be the proper maximum retail gross margin for the community.

Facts and data ascertained by this investigation along with the committee's recommendations are forwarded to the State Fuel Administrator, and he then establishes the maximum retail gross margin for that community. The maximum retail price in that community is then determined by adding this maximum retail gross margin to the price of coal at the mine and to the transportation charges.

The chief service rendered by establishment of maximum retail prices has been prevention of a run-away market or price panic, which would result in absence of regulation and from insufficient supply.

BITUMINOUS COAL NEEDED IN 1918-19

FROM a census of the war industries and similar activities, undertaken by the United States Fuel Administration in May, 1918, estimates were compiled as the basis for an announcement, made on June 6, that the fuel supply of the country must be increased by more than 80,000,000 net tons over the production of 1917.

The percentage of production had been varying during April and May from about 63 to 77 per cent. of total capacity, meaning that total losses from 100% capacity had been 23 to 37 per cent. During the first nine weeks of the coal year the average losses were about 26%, of which car shortage caused 13%. The remaining 13% of losses was caused by: Labor shortage, 5.8%; mine disability, 3.2%; lack of orders, 1.6%, and all other causes, 2.4%. These percentages were figured on the country as a whole. In various districts the car shortage had been at different times often above 50 per cent., and had risen as high as 59.5%. Labor shortage some weeks in other districts had risen above 20%, and once as high as 31.1%.

Beginning with June these percentages showed a decided improvement. Percentages of capacity jumped to 82.3 and car shortage dropped to 7.8 per cent. The "Order Early" campaign had caused the loss from lack of orders to drop below one per cent.

The most strenuous efforts to increase production had been exerted and met most gratifying response when the records for production after June 1st surpassed anything ever before accomplished. These

records were made in the face of the fact that the number of mine-workers had been depleted by thousands. They were as follows:

Week Ended	Net Tons	Same Week 1917	Week Ended	Net Tons	Same Week 1917
June 8	12,427,000	10,832,000	Sep. 7—5 das.	11,215,000	9,933,000
June 15	12,606,000	11,504,000	Sep. 14	12,707,000	10,977,000
June 22	11,999,000	11,284,000	Sep. 21	12,699,000	10,696,000
June 29	12,344,000	11,583,000	Sep. 28	13,043,000	11,138,000
July 6—5 das.	10,252,000	9,268,000	Oct. 5	12,560,000	10,808,000
July 13	13,286,000	11,793,000	Oct. 12	12,250,000	10,924,000
July 20	12,924,000	11,231,000	Oct. 19	11,516,000	10,125,000
July 27	12,937,000	11,261,000	Oct. 26	11,314,000	10,804,000
Aug. 3	12,545,000	10,783,000	Nov. 2	10,857,000	10,893,000
Aug. 10	12,289,000	10,634,000	Nov. 9	10,381,000	11,071,000
Aug. 17	11,928,000	10,266,000	Nov. 16	9,724,000	11,279,000
Aug. 24	12,636,000	10,744,000	Nov. 23	*10,990,000	11,187,000
Aug. 31	12,691,000	11,046,000	Nov. 30	*9,710,000	10,565,000

* Subject to slight revision.

Bituminous production, April 1 to Sept. 30, 1918................ 312,282.414 net tons
" " " " 1917................ 274,537,172 " "

Increase, 1918 over 1917, 37,745,242 tons.

The analysis of the country's needs, compared with consumption of the previous year, made public on June 6, was as follows:

Class of Use	Required 1918-19 Net Tons	Consumed 1917 Net Tons	Per Cent. Increase
Industrial	249,025,000	204,907,000	18
Domestic	75,678,000	66,915,000	13
Gas and electric public utilities	37,941,000	33,038,000	15
Railroads	166,000,000	155,000,000	7
Exports	24.000,000	24,000,000	..
Beehive Coke	52,450,000	52,450,000	..
Bunker—Foreign	10,000,000	7,700,000	30
Bunker—Domestic, inc. Great Lakes	5,000,000	5,000,000	..
Power and heat at coal mines	12,500,000	11,000,000	14
Substitution, coal for oil, in Northwest	2,000,000	....	..
TOTALS	634,594,000	560,010,000	13.32
Deduct: Imports	....	907,000	
" Used from storage	....	4,375,000	
NET TONS OF PRODUCTION	634,594.000	*554,728,000	14.4
Increased requirements over 1917	....	79,866,000	14.4

* This was the estimated production for 1917, until recent revision.

BITUMINOUS STATISTICS UP TO OCTOBER

Following are the figures on production of bituminous coal during the first nine months of 1918, compared with the same months during the previous three years:

	1918	1917	1916	1915
January	42,607,206	47,967,354	46,596,094	37,190,800
February	44,384,937	41,352,711	45,186,515	27,321,443
March	48,631,115	47,868,652	43,821,604	31,800,830
April	46,590,570	41,854,320	33,628,164	29,968,240
May	50,927,195	47,086,452	38,803,759	30,938,434
June	51,758,214	46,824,646	37,741,972	33,956,818
July	55,587,312	46,291,572	38,113,105	35,573,809
August	55,732,092	47,372,226	42,695,735	38,160,995
September	51,687,031	45,107,956	42,098,831	40,963,780
Total, 9 months	447,905,672	411,725,889	368,685,779	305,875,149
October		48,337,726	44,807,205	44,197,763
November		47,689,801	44,927,817	44,736,760
December		44,037,147	44,097,744	45,814,754
Total year....		551,790,563	502,518,545	442,624,426

ANTHRACITE ALLOTMENTS FOR 1918-19

AFTER completing a thorough investigation as to prospective anthracite coal production during the coal year of 1918-19, and after taking into consideration the uses it best serves and to what sections it can be transported most readily from the anthracite region, the Fuel Administration on June 1, 1918, announced an apportionment of anthracite to the various consuming sections.

Increased allotments over distribution of the preceding year were made to New England and Atlantic states, to meet the greater requirements of their largely expanded population. Allotments for central and north-central states and Canada were reduced and supply cut off entirely from trans-Mississippi and southern and western states, on account of the necessity of first supplying the congested area near the anthracite mine regions and reducing transportation.

The nation's only anthracite region centers in and around the counties of Schuylkill, Wyoming and Luzerne, Pa., only a hundred miles or so from the Atlantic seaboard. There are no bituminous mines so near to the congested northeast area. From the anthracite mines it is a much shorter haul to New England and the other northeastern states than from any other coal mines.

The north central states are situated from 400 to 800 miles from the anthracite region. They have heretofore been fully supplied with anthracite for domestic purposes, but this year have been curtailed from ten to sixty per cent. and have been asked to make up the balance from soft coal fields near to their doors in order to avoid much transportation, as the railroads are taxed to the utmost meeting the war's requirements.

The war, by reason of the army draft and in many less direct ways, seriously affected the army of anthracite workers, reducing the ranks steadily from 176,552 in 1915 to about 145,000 this spring.

When the coal year started, April 1, 1918, there was absolutely no stock of anthracite left over.

Anthracite Transported April 1 to August 31, 1918

At the beginning of the present coal year the Fuel Administration prepared a program of distribution of anthracite to the various sections of the country, and has attempted to see that this program is carried out by months in shipments to each section as scheduled. The following table shows in gross tons of 2,240 pounds, how nearly this schedule was followed during the first five months of the coal year:

Section	Allotted	Transported
New England	4,304.585	4,760,716
Atlantic States	(a)13,090,480	12,851,137
Central States	1,450,810	1,559,865
Northcentral States	991,665	(b)872,316
Trans-Mississippi	60,415	64,759

(a) This is the territory easiest to reach from Anthracite regions.

(b) This does not include amounts at lake docks, or in transit, amounting to about 800,000 gross tons more.

FACTORIES NOT TO USE ANTHRACITE

It having been pointed out to the Fuel Administration that anthracite coal was being substituted for bituminous in making steam, a letter condemning the practice and sounding a warning against it was sent out early in April, 1918. A month later the Administration's attitude was made more positive in a letter which said:

> The Administration is satisfied that one cause of domestic difficulties last winter in New England was the fact that with the extreme shortage of bituminous coal prevailing in New England and the northwestern section of this country, dealers were prevailed upon by industries to give them domestic sizes of anthracite in order that they might keep their plants in operation.
>
> Every ton of coal so diverted from its proper and normal channels of consumption meant increased difficulty on the part of domestic consumers in having their requirements taken care of. The Administration does not want any anthracite coal turned over to industrial plants without having the case passed upon and the facts established that the industry must have anthracite coal, and further no dealer shall deliver anthracite to an industrial concern without an exemption from the Federal Fuel Administration.

SHIPMENTS OF ANTHRACITE COAL

Reported by the Anthracite Bureau of Information, Philadelphia. Figures are in gross tons of 2,240 lbs.:

	1917	1918
January	5,940,725	5,638,383
February	5,178,432	5,812,082
March	6,989,075	7,276,777
Three months' total	18,108,232	18,727,242
April	5,592,299	6,368,373
May	6,917,525	6,887,256
June	7,049,037	6,867,669
Six months' total	37,667,093	38,850,540
July	6,724,252	7,084,775
August	7,013,996	7,180,923
September	6,372,756	6,234,395
October	7,110,950	6,286,366
November	6,545,313	
December	5,698,945	
Total for year	77,133,305	

Adding to these shipments the amount used for heat and power at mines and in mining towns, the total anthracite production in 1917 was 99,611,811 net tons of 2,000 lbs.

Number of Mine Employees in 1917

The number of men employed in producing anthracite coal decreased from 159,869 in 1916 to 154,174 in 1917. The number engaged in producing bituminous increased from 561,102 in 1916 to 603,143 in 1917.

In both branches of the coal-mining industry in 1917 there was a gain over 1916 in the number of men employed on the surface, which is significant when it is realized that it is the underground worker who actually produces the coal and who is the more skilled workman.

In the anthracite regions the number of underground employees decreased 5.8 per cent., but the surface employees increased 2.4 per cent. The number of men employed underground producing bituminous increased from 474,244 in 1916 to 498,185 in 1917, a gain of but 5 per cent. compared with a gain of 20.8 per cent. in surface employees.

The average number of days worked in 1917 in both bituminous and anthracite mines was the highest recorded—243 in the bituminous fields and 285 in the anthracite. In 1916 the average was 230 in the bituminous and 253 in anthracite fields.

BEST OF COAL FOR THE SHIPS

Strict regulations govern shipments to the Atlantic seaboard of coal intended for the bunkering of ships. Only the highest grade of coal for steam-making is permitted for this service, to the end that each ship shall have a greater steaming radius and higher speed.

Under regulations issued in April, 1918, by Fuel Administrator Garfield, it is prohibited that coal be delivered to any Atlantic or Gulf port for bunkering purposes other than that specified by the Fuel Administration as permissible bunker coal. The shipment of coal smaller than run of mine, to any port for bunkering purposes, or to any pool designated as a "permissible coal pool" is prohibited except when special permission is granted by the Fuel Administration. On July 2, 1918, twenty-five additional inspectors were appointed to supervise more thoroughly the preparation of coal for ships.

Orders issued by the Fuel Administration, effective July 23 and July 31, 1918, revised former regulations relative to the required quality and grades of coal for bunkering steamships. The purpose of the orders was to improve the quality and enlarge the quantity of coal for ships in the Atlantic trade.

The removal of the submarine menace to shipping after the signing of the armistice enabled the Fuel Administration, by an order issued on November 25th, to make coal supplies available for bunkering purposes from pools Numbers 4 and 10, the use of coal from these pools being prohibited heretofore because its smoke producing qualities invited attack by U-Boats. The addition of these pools enable the more expeditious movement of trans-Atlantic shipping.

SITUATION IN THE COKE INDUSTRY

Coke is the solid residue remaining from bituminous coking coal after the volatile matter has been expelled by heat. In beehive ovens, so named from their dome form which resembles somewhat the old beehive, the volatile matter is all consumed in the oven chamber above the coal. By-product or retort ovens are heated by the combustion of gases in heating flues built in the walls of the ovens. The heat, passing through the oven walls into the coal, drives off the volatile matter, converting the non-volatile portion of the coal.

As ammonia and certain fractions of the light oil, especially toluol and benzol are required in the manufacture of explosives, the building of by-product ovens has been greatly stimulated by the war demand for these products. As coke production in by-product ovens increases, beehive ovens will go out of commission. This change in the process of coke making will result not only in a greatly increased production of useful by-products, but also in conserving of the coal resources of the country. The following table shows the yields of the primary

products which may be obtained from a ton of good coking coal, if coked in a beehive oven or in a modern improved by-product oven:

Average Yields From 2,000 Lbs. of Coking Coal

Product	In Bee Hive Ovens	In By-product Ovens
Coke	1,300 lbs.	1,440 lbs.
Surplus gas	None	5,000 cu. ft.
Ammonium sulphate	None	22 lbs.
Combined light oils	None	2½ gals.
Tar	None	9 gals.

The surplus gas and the tar are generally used as fuel instead of coal or oil. Their fuel value is approximately equivalent to 350 pounds of good coal, hence one ton of coal coked in a modern by-product oven gives fuel results equal to those obtained from 2,215 pounds of coal coked in a beehive oven and 350 pounds of coal consumed for other purposes, and thus actually saves 565 pounds of coal.

The following table gives the production of coke in net tons for different periods:

	By-product	Bee-hive	Total
Year 1916	19,069,361	35,464,224	54,533,585
Year 1917	22,439,280	33,167,548	55,606,828
Jan., Feb., Mar., 1918	5,176,742	7,298,167	12,474,909
Apr., May, June, 1918	6,247,695	8,338,000	14,585,695
Week ended July 6	502,666	579,000	1,081,666
Week ended July 13	506,451	680,000	1,186,451
Week ended July 20	517,671	632,000	1,149,671
Week ended July 27	523,899	616,000	1,139,899
Week ended Aug 3	530,642	614,000	1,144,642
Week ended Aug. 10	526,955	574,000	1,100,955
Week ended Aug. 17	536,323	575,000	1,111,323
Week ended Aug. 24	546,058	592,000	1,138,058
Week ended Aug. 31	550,921	608,000	1,158,921
Week ended Sept. 7	556,401	615,000	1,171,401
Week ended Sept. 14	553,371	632,000	1,185,371
Week ended Sept. 21	557,550	614,000	1,171,550
Week ended Sept. 28	576,254	610,000	1,186,254
Week ended Oct. 5	585,281	574,000	1,159,281
Week ended Oct. 12	573,743	600,000	1,173,743
Week ended Oct. 19	578,027	572,000	1,150,027
Week ended Oct. 26	580,672	593,000	1,173,672
Week ended Nov. 2	577,757	558,000	1,135,757
Week ended Nov. 9	581,665	558,000	1,139,665
Week ended Nov. 16	*570,990	*552,000	*1,122,990
Week ended Nov. 23	*574,847	*521,000	*1,195,847
Week ended Nov. 30	*572,494	*522,000	*1,094,494

* Subject to slight revision.

During January and February, 1918, the production of coke was interfered with seriously by bad weather which prevented regular movements of the product from the beehive ovens and of coal to by-product ovens.

The Fuel Administration on December 1st, 1918, vacated an order, issued on May 7th, placing an embargo on account of traffic congestion on the shipment of coke through the New England gateways. The original order prohibited the shipment of coke produced in any of the New England states to points west of the Hudson river, and the shipment into New England of coke produced in the states of Maryland, New Jersey, New York, Pennsylvania and West Virginia.

BUREAU TO STIMULATE PRODUCTION

THE Production Bureau of the Fuel Administration is headed by James B. Neale, anthracite advisor to Administrator Garfield. This Bureau has concentrated special efforts upon increasing efficiency of individual mines and miners, in both bituminous and anthracite industries in order to accomplish the greatest possible output with the labor and mining facilities available.

The result of the work to stimulate production, while apparent to students of statistics during April and May, and even earlier, began to be widely noticed when the bituminous production of 12,427,000 tons during the first week of June was announced. From then on a steady output usually exceeding two million tons per day was maintained, even though a smaller force of men was working.

Twenty-eight Production Managers and several assistants bend efforts to increase the output of coal per man per day, and offset loss caused by depletion in miners' ranks through calls to other war service. There is a special production committee in each mine, of six members, three chosen by the operators and three by mine workers. They urge all miners to toil eight hours a day, six days a week; and keep track of individual workers, reporting on tonnage produced, and if there are shortages or absences, report on causes of these. Men known to be patriotic are selected on these committees.

A committee in Washington works in conjunction with the War Industries Board to obtain priority for material or equipment needed by mines. Coal comes first, under an order of the War Industries Board issued on August 30, 1918, covering the distribution of power by the West Penn Power Company in the Pittsburgh District.

The Production Bureau has impressed upon the coal mining industry the necessity of co-operation of mine operators, managers and mine workers in order that maximum efficiency be maintained.

President's Appeal to All Engaged in Coal Mining

President Wilson, on August 9, 1918, issued a proclamation addressed "To All Those Engaged in Coal Mining." He said:

"The existing scarcity of coal is creating a grave danger—in fact, the most serious which confronts us—and calls for prompt and vigorous action on the part of both operators and miners. Without an adequate supply our war program will be retarded; the effectiveness of our fighting forces in France will be lessened; the lives of our soldiers will be unnecessarily endangered and their hardships increased, and there will be much suffering in many homes throughout the country during the coming winter.

"I am well aware that your ranks have been seriously depleted by the draft, by voluntary enlistment, and by the demands of other essential industries. This handicap can be overcome, however, and sufficient coal can be mined in spite of it, if every one connected with the industry, from the highest official to the youngest boy, will give his best work each day for the full number of work hours.

"The operators must be zealous as never before to bring about the highest efficiency of management, to establish the best possible working conditions, and to accord fair treatment to everybody, so that the opportunity to work at his best may be accorded every workman. The miners should report for work every day, unless prevented by unavoidable causes, and should not only stay in the mines the full time, but also see to it that they get out more coal than ever before. The other workers in and about the mines should work as regularly and faithfully so that the work of the miner may not be retarded in any way. This will be especially necessary from this time forward, for your numbers may be further lessened by the draft, which will induct into the Army your fair share of those not essential to industry.

"Those who are drafted but who are essential will be given deferred classification, and it is their patriotic duty to accept it. And it is the patriotic duty of their friends and neighbors to hold them in high regard for doing so. The only worker who deserves the condemnation of his community is the one who fails to give his best in this crisis; not the one who accepts deferred classification and works regularly and diligently to increase the coal output.

"A great task is to be performed. The operators and their staffs alone cannot do it, nor can the mine workers alone do it; but both parties, working hand in hand with a grim determination to rid the country of its greatest obstacle to winning the war, can do it. It is with full confidence that I call upon you to assume the burden of producing an ample supply of coal. You will, I am sure, accept this burden and will successfully carry it through, and in so doing you will be performing a service just as worthy as service in the trenches, and will win the applause and gratitude of the whole nation."

Speakers Tour the Mining Regions

John P. White, Labor Representative in the Fuel Administration, a former president of the United Mine Workers, delivered a series of addresses late in June, in Pennsylvania and Maryland, urging both operators and miners to utmost activity. This campaign extended to all coal fields. Several survivors of the present war, returned from France, toured the fields and addressed the miners.

Frank J. Hayes, president of the United Mine Workers, toured the anthracite fields during July, speaking to mine operators and mine workers on the imperative need of speeding up production.

The War Commission of the Presbyterian Church, seventy laymen and preachers from all parts of the United States and Canada, called at the Fuel Administration on September 19, 1918, and offered their services in any capacity they might be found of use. Moderator J. Frank Smith, of Dallas, Texas, stated that the members of the War Commission were preparing for a speaking drive to cover the entire nation from November 10 to December 10.

Expressing the hope that the clergy would do all in their power to urge mine workers to their greatest efforts towards increasing production of "that which is really at the present time the sinews of war," Cardinal Gibbons, on August 23, 1918, wrote to Fuel Administrator Garfield a letter which was at once given wide circulation throughout the mining regions. "I sincerely hope that every minister of religion," he said, "especially in the mining districts, will put before his congregation the great principle that patriotism is devotion to country; that those who love their country must serve their country in the most acceptable way, and must give their services, not where they would choose, but where the Government thinks they can be the most useful."

General Pershing Urged Bigger Production

General Pershing, on October 17th, sent a cablegram to Fuel Administrator Garfield in which he said:

> Let there be no shortage of coal. The more coal you produce, the sooner we shall have peace. Every American soldier expects to be backed by the miners of America.

His message was immediately telegraphed to the production manager of each mining district.

To enhance production, miners were encouraged to work on Liberty Loan Day, April 26, 1918, although it had been proclaimed a nation-wide holiday. On the day before, Fuel Administrator Garfield sent a telegram to operators and mine workers' officials, as follows:

> I have consulted with President Wilson, who is quite willing that miners should continue at work tomorrow wherever cars are available, on the ground that coal is a basic necessity and that this labor will not be regarded as contrary to his proclamation.

On July 1, 1918, Administrator Garfield sent out an appeal to all miners to confine their Fourth of July celebration to one day, and this appeal was generally observed.

On October 10, Mr. Garfield sent out an appeal to the unions to produce as much coal as possible on October 12, the anniversary of the discovery of America, which had been proclaimed Liberty Day and a holiday by President Wilson.

Miners' Labor Day Blow at the Kaiser

Administrator Garfield, on August 30, issued an appeal to all mine workers not to extend their celebration of Labor Day, September 3, beyond the one day.

"The more coal we produce the fewer lives will be sacrificed in battle," he said, "for coal means everything in transportation, equipment, guns and ammunition which America's soldiers must have to speed the end of the war. The more coal mined now the more shells will be available, the fewer lives lost in the battle line and the quicker will be ultimate victory."

The appeal met with hearty response from the miners, and at many collieries a full day's output was produced on the holiday. In numerous mines the workers put in several hours of labor the night before Labor Day. In the Pocahontas and Tug River districts of West Virginia, which supplies fuel peculiarly adapted to the needs of the marine service, 95% of a normal day's loading was made on the holiday. In the Connellsville district of Pennsylvania the prime source of coal from which coke is made for steel plants, the miners, by sacrificing their holiday, turned out a record production Labor Day week.

WAGE AGREEMENT SETTLED STRIKES

To settle numerous strikes that were on hand when the United States Fuel Administration was organized, and to promote a more harmonious condition at the mines, a conference of miners and operators was held in Washington, beginning October 6, 1917.

The outcome of the conference was a supplemental agreement to be appended to existing agreements between operators and miners.

Under the agreement, bituminous mines adopting it were allowed an increased price of forty-five cents per ton, to cover increased wages. The miners were obligated not to strike or cease working without cause. The agreement carried a penalty enforceable against miners and operators for non-compliance. It also directed the strengthening of existing agreements to make the penalty more effective.

All fines imposed under the agreement are collected automatically, and operators refusing or neglecting to make the collections are subject to a fine of two dollars for each employee subject to be fined. No fines are permitted to be refunded except by mutual agreement of the accredited representatives of the miners and operators.

This agreement was first adopted in the districts comprising the Central Competitive Field, which includes Illinois, Ohio, Indiana and Western Pennsylvania. The agreement has been extended since to other fields. In the bituminous field the penalties have been fixed by mutual agreement in each of the mining districts.

In the anthracite region a blanket agreement was made prescribing penalties throughout the field and the Government allowed the operators an increase of 35 cents a ton in selling price at the mines.

A readjustment of wages in the anthracite coal industry, in order to stabilize them with reference to the bituminous and other related industries, was ordered October 31st, 1918, by the United States Fuel Administrator. The readjustment, which became effective November 1st, provided, in general terms, for an average wage increase of a dollar a day for anthracite miners.

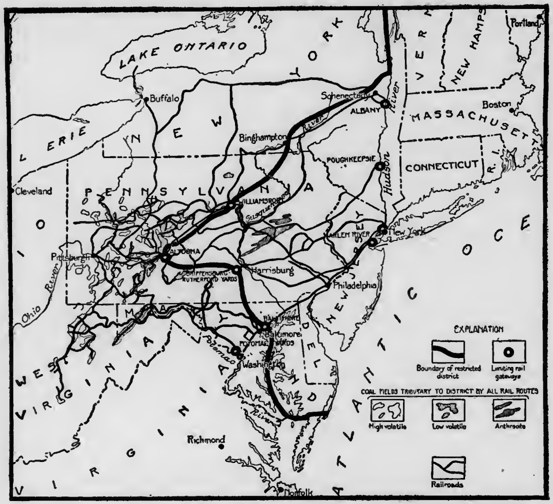
Ruling Controls Prices Affected by Freight Rates

A regulation prohibiting coal distributors and dealers from adding to the price they charge for coal any increased freight rate which the dealers or distributors have not actually paid or become obligated to pay, was issued on June 24, 1918, by the Fuel Administration. A general increase in freight rates on coal became effective June 25. On that date large stocks of coal were in the hands of dealers who had paid the old freight rate. These dealers were not allowed to increase their selling prices on this coal to include the new increased rate. The regulation also applied to coal shipped to the various "pools" at tidewater.

INDUSTRY MUST SPREAD WEST AND SOUTH

As a means of relieving congestion of traffic lines and of manufacturing conditions in the northeastern portion of the country, the War Industries Board, the United States Fuel Administration and the United States Railroad Administration announced, on June 12, 1918, a policy of limiting new production within this district.

The congested area comprises New England; Eastern and Southeastern New York as far west as Binghamton; Pennsylvania, as far west as Williamsport, Altoona and Harrisburg; all of New Jersey, Delaware and Eastern Maryland, not including Baltimore.



Map of Congested Manufacturing and Transportation District in Northeastern United States

The matter of moving coal and raw materials into the congested area, as well as of transporting the finished product away, is one of the most difficult problems with which the Government has to deal.

To overcome these difficulties the War Industries Board and the Fuel Administration have undertaken to limit manufacture in the congested district to the present status of output, and have new orders placed in territory farther west and south.

BITUMINOUS ZONE SYSTEM

The Fuel Administration, co-operating with the Director-General of Railroads, announced in March, 1918, a zone system, to cover distribution of bituminous coal during the coal year beginning April 1.

This method of distribution was established so that the coal supply of all sections of the country should normally be derived from mines relatively near, thus preventing abnormal and wasteful transportation movements, and insuring more equal distribution of cars to the mines, and the more steady employment of mine labor.

The system provided for retention of about 5,000,000 tons of coal for the East, which heretofore went West. It eliminated the movement of more than 2,000,000 tons of Pocahontas coal to Chicago and other western points over a haul of about 660 miles.

Estimates made early in the year were that approximately 160,000,000 car miles would be saved in the coal year through the operation of the zone system, and the Fuel Administration announced on November 19, 1918, that the expectations were being fully realized. It was also estimated that the movement of bituminous coal affected by the zone system would involve about 300,000,000 tons, or 60 per cent. of the total production.. The latest figures show that considerably more than 300,000,000 net tons of this kind of coal have been produced and delivered since April 1st, the beginning of the coal year, and that 60 per cent. of it was affected by the zone system.

These later figures show that even more than the originally estimated 160,000,000 car miles will be saved in round trips to and from the mines, and that considerably more than 300,000 additional trips which the saving in car miles would effect will be made. Exact figures have not been compiled, but the early estimate allowed for the 300,000 additional trips being the equivalent of 5 per cent. increase in the production.

ORDER TO INSURE CLEANING OF COAL

The Fuel Administration in March, 1918, announced the organization of an inspection system to enforce mining and shipping of clean coal. Subsequently, under an order effective June 1, 1918, coal condemned by the Fuel Administration for lacking preparation, or because it contains a large percentage of impurities must be sold at 50 cents per ton less than the fixed Government price for the mine.

Authority was given to district representatives of the Administration to appoint inspectors of knowledge and experience, to inspect the product of the various mines, and with sufficient authority to enforce the cleaning of coal at the mines. They were empowered to order the suspension of operation in mines where the coal was found naturally to be of such character as to be unfit for market. The order did not change the terms, conditions or validity of existing contracts, but new contracts were made subject to it.

Up to November 19, 1918, a total of 119 mines had been shut down because their products were improperly prepared. Of this number, twelve received permission to resume operations.

DRASTIC CONTROL OF FUEL IN EUROPE

As a war measure belligerent countries of Europe have had to take radical steps to insure advantageous use of coal resources. Their serious shortage has made drastic economy unavoidable.

The coal mines of Great Britain and Ireland were placed under Government control early in 1917. All dividends paid and all wage agreements must be approved by the Government. On account of the advance in cost of food and other necessities, which is figured there to average 94 per cent., increase in prices of coal amounting to from $1.00 to $1.60 per ton have been authorized. Army and Navy requirements and Government industries, including munition plants and railroads, are given priority in distribution of coal and allotment of cars.

At the beginning of the war about 240,000 miners of the United Kingdom, out of a total of about one million, enlisted in the army, and the industry was seriously crippled. Then a regulation was put in force providing that no miner could enlist in the war without the approval of a local board established in each district to pass upon enlistments. The result was that men employed in various other occupations immediately applied for work in the mines.

Under new British regulations, put in force on July 1, 1918, an average of slightly less than one ton of coal per year per room is allowed to householders. England has also recently curtailed the use of fuel oil and gasoline for pleasure automobiles. War manufacture within Great Britain, France and Italy depends largely upon the mines of Great Britain for its fuel supply. Coal is also sent to neutral countries in exchange for food and supplies.

The new British restrictions limit domestic consumption per year as follows: For three rooms, occupied, 3½ tons of coal, and 7,500 cubic feet of gas, or 120 B. T. U. electricity; six rooms, five tons of coal, and 11,250 cubic feet of gas, or 180 B. T. U. electricity; nine rooms, eight tons of coal and 15,000 cubic feet of gas, or 240 B. T. U. electricity; twelve rooms, eleven tons of coal, and 18,750 cubic feet of gas, or 300 B. T. U. electricity. Local overseers may make special grants under certain conditions to prevent hardships.

The French and Italian governments have assumed complete control of distribution. In May, 1917, the Russian provisional government took over the coal mines of that country for the purpose of controlling distribution and prices. Fuel is so scarce in France that during the winter of 1917-18 the amount of coal allowed to domestic consumers was approximately 11 kilos, or 24 pounds, per month. The colder sections received a larger amount and the warmer sections a smaller amount, but in all cases the allowances were much less than the minimum requirements for comfort. Strict limitations were imposed on the consumption of gas and electricity.

Since the loss of Alsace-Lorraine, France produced, before the present war, only about two-thirds of the coal she consumed, and the portions since invaded contain her principal coal mines. This has made necessary more extensive exploitation of other mines. In 1913 she used about 65,000,000 tons, of which she produced about 45,000,000 tons and imported the balance from Great Britain, Germany and Belgium. In 1916 her consumption was curtailed to about 40,000,000 tons, of which she produced 24,000,000 tons and imported 16,000,000 tons. Her production for the year 1917 is estimated to have been 30,800,000 tons.

Early in the war Germany centralized the entire coal industry under government control. In Berlin a new plan of distribution was put in force in May, 1918. A dealer is obliged to supply customers in exact accordance with tickets issued by the government, one for cooking and one for heating coal. For cooking, a family of one or two persons is allowed 1,200 pounds; three to six, 1,600; seven to ten, 3,200. As to coal for heating, one room is allowed 500 pounds, two rooms 1,000, and so on up to 6,000 pounds. Persons who used more than six tons for heating last winter will be allowed half what they used then.

GERMANS WRECKED FRENCH COAL MINES AT LENS

Damage done by the Germans to the coal mines at Lens, France, is so great that production cannot be resumed for periods ranging from eight months to three years, in the opinion of members of the special commission of the Fuel Administration, as expressed in a cablegram received on November 25 by Harry A. Garfield, United States Fuel Administrator.

The message, which was sent from Paris after a three-days' inspection of mines in the Lens region, states that the damage varies in degree; that production cannot be resumed for periods ranging from eight months to three years, and that plans for reconstruction are still under advisement.

The cablegram was signed by Walter E. Hope, who joined the Fuel Administration September 19, 1917, as Director of the Bureau of State Organizations. He, with S. Brinckerhoff Thorne, coal expert, of New York, and James H. Allport, Engineer to the Fuel Administration, make up the commission which went to Europe late in October to inquire into conditions and government regulations affecting the coal industry in foreign countries.

COKE COMPANY REQUIRED TO REFUND $80,000

Refund of a sum approximating eighty thousand dollars was arranged on September 7, 1918, by the Fuel Administration between a coke company of Pittsburgh, and two iron and steel companies. The refund came as the outcome of the delivery of inferior coke to the iron and steel companies. The coke company had contracts providing for delivery of coke made from washed coal to blast furnaces of the other two companies.

Last November the coke company's washery broke down and shortly thereafter burned, rendering the producers unable to ship coke of the quality contracted. To secure maximum output the coke company installed coke-drawing machines which kept up the regular output, but, as appeared, reacted unfavorably on the quality. Both the iron companies were seriously damaged, not only by increased fuel consumption, but also by inability to meet requirements for metal.

OPERATION OF THE JANUARY SHUT-DOWN ORDER

The order issued by the Fuel Administration on the 17th of January calling for a stoppage of work by all industries except those absolutely essential to the war and enforcing other restrictions, was one of the most drastic but at the same time most necessary orders yet issued in connection with our military program.

The sudden enormous increased demand for fuel for war making purposes left but a narrow margin of coal for the winter. Coal production and transportation are always reduced by weather conditions during the winter months. Unfortunately the winter of 1917-1918 was severe beyond the recollections of the present generation. Blizzard after blizzard blocked the railways and hindered all forms of outdoor activities.

The mining and movement of coal, in spite of Herculean efforts, grew less and less through December and January. Ships with supplies for our troops and our Allies accumulated in all the harbors waiting for fuel. The movement of coal to iron and steel furnaces and other fundamental industries grew slower and slower. Unfortunately, the larger part of our coal production is concentrated in a few states and along the lines of four or five railways.

The movement of this freight through the terminal yards became more and more difficult and congestion at vital points more and more serious. For seven weeks the steel director's charts showed lines of production dropping lower and lower. The manufacture of ship plates dropped to 30 per cent. of normal. The manufacture of all forms of iron and steel became less each week.

The Railroad Administration and the Fuel Administration worked together to relieve this congestion. Four hundred and eighty ships waiting in our ports had to be bunkered. The iron and steel mills had to be got back to normal production at once or we were face to face with military disaster.

By the middle of January it became evident that nothing but very drastic action would relieve the situation. Mr. Garfield in discussing it with his associates said, "It is like a panic in a theatre fire. The crowd is wedged in and the more it struggles forward, the less progress it makes. We must ask the industrial forces of the country to stop long enough to relieve the congestion and set the currents of production and transportation going again, or we will certainly have a complete tie-up."

On January 17th the order was issued for a complete shut-down for five days of all industries excepting those exempted for military reasons by heads of the war making departments, followed by a weekly shutdown of one day to be continued until the congestion was relieved.

It was impossible or unwise to tell the country of all the military reasons for this order. Naturally there was complaint but the order was loyally obeyed. Within three weeks the 480 ships had been bunkered and sent on their journey. Within a month the lines of production on the steel director's charts had risen again to their normal level. The remedy was drastic but it completely effected its purpose. There has been no delay in the ships going to France on account of coal from that day to this. Steel and iron production, after recovering from the almost complete prostration of January, has increased steadily until this time. The industries most seriously affected by the temporary shutdown profited the most from its results. Further delay in clearing the tracks would certainly, in the light of two severe blizzards which followed, have reduced the available coal to such an extent that it would unquestionably have been necessary to confine deliveries through many weeks, if not months, to the essential war industries.

The shutdown not only relieved the railroads of coal deliveries but it temporarily relieved them of the enormous amount of routine commercial freight so that in spite of frozen switches and snow encumbered yards, they were able to disentangle the enormous collection of stalled freight and free both yards and tracks of that congestion which was holding everything up. Each of the three Mondays following the original shutdown served as a clearing up day and helped speed the growing movement of freight.

By the fourth Monday the situation had so righted itself that the Fuel Administration felt at liberty to suspend the further Monday closings provided in the original order, excepting that the New England situation being more critical, the Monday closing was continued for another week in order to finish the clearing up of the railroad congestion in that territory.

LICENSES FOR COAL JOBBERS

The Fuel Administration, in March, 1918, decided to provide coal jobbers with licenses, authorizing them to operate because it was discovered that various abuses had sprung up. Among these was the organization of affiliated companies solely for collecting the jobbers' margin, the "swapping of coal," and other fictitious trade operations, which increased the cost of coal to the consumer. The Fuel Administration did not attempt to eliminate legitimate jobbers, but on the contrary recognized their importance to the trade.

Accordingly, upon the recommendation of the Fuel Administration, the President issued a proclamation providing for the licensing of jobbers. Regulations carrying out the order were at once adopted. Under these regulations the licensee may purchase and resell coal for his own account. When he acts in this capacity he may not sell at any price in excess of the Government mine price.

On the other hand, performing his function of rendering service to consumer or retail dealer in procuring coal, he may, when he has been authorized by dealer or consumer, buy for them at any price not in excess of the Government mine price; and those who choose to employ him for this purpose may compensate him by paying a purchasing commission, not to exceed in any case the reasonable limit fixed in the regulations as maximum compensation for that service. In this transaction he may not make any profit, directly or indirectly, other than his purchasing commission.

"LIGHTLESS NIGHTS" ORDERS

"Lightless Nights" were inaugurated by the Fuel Administration, November 15, 1917, for the purpose of conserving the fuel supply of the nation. On December 14, lightless nights were restricted to Sundays and Thursdays. Sunday, December 16, 1917, was the first day on which this order became effective. On April 22, 1918, this order was temporarily suspended.

A new order effective July 24 stipulated that use of light produced by coal, gas, oil or other fuel for illuminating or displaying advertisements, announcements or signs, or for the external ornamentation of any building would be discontinued entirely on Monday, Tuesday, Wednesday and Thursday of each week within New England and the States of New York, Pennsylvania, New Jersey, Delaware, Maryland and the District of Columbia; and, on Monday and Tuesday of each week in all the remainder of the United States.

New regulations on "Lightless Nights," superseding all previous orders, became effective November 11th, 1918. In New England, New York, Pennsylvania, New Jersey, Delaware, Maryland, District of Columbia, Michigan and Ohio, the change from the previous order had reference to the illumination of store or shop windows. Under the new order, the store or shop window lighting was restricted only when the store was closed and then only on lightless nights.

On November 20th, 1918, the "Lightless Nights" order was entirely set aside, except in those states where the Federal Fuel Administrators felt the necessity for its continuance.

DAYLIGHT SAVING, HERE AND ABROAD

Daylight saving, from Sunday, March 31, to Sunday, October 27, 1918, was established by Congress in March, 1918, as an effective method of conserving health, and mineral resources. All clocks were moved forward one hour, at 2 A. M., March 31.

The adoption of the plan by the United States is attributable to its successful operation in Great Britain, France, Italy, Germany, Austria, Holland, Denmark, Sweden, Norway, Portugal, Australia, and Iceland.

At the conclusion of the first trial of daylight saving by the United States the Fuel Administration computed that 1,250,000 tons of coal had been saved in the seven months during which the system had been operative. This figure was based upon a large collection of data, and also upon definite records for one community of about 1,000,000 population.

FUEL ADMINISTRATION UNFURLS SERVICE FLAG

A service flag, bearing fifty stars, each star representing a former Fuel Administration employee in active war service, was hoisted at noon, September 6, 1918, on the building of the Fuel Administration in Washington with simple ceremonies, in the presence of nearly one thousand employees of the Administration. Fuel Administrator Garfield, two of whose sons are in the service, made a brief speech.

REVISION OF STORAGE REGULATIONS

The Fuel Administration announced on September 14, 1918, the regulations governing the storage of coal by consumers listed on different preference schedules. This revision brought the practical distribution of coal into line with the statistics of production and consumption in different districts.

The plan was to obtain the utmost from our transportation equipment with the least danger of any district being out of coal on account of its distance from the mines, and the plan worked so well that on November 22, 1918, the Fuel Administration was able to announce the removal of all storage restrictions on bituminous coal, in conformity to the action of the War Industries Board in cancelling its preferential industries list. Anthracite coal was not affected, however, by this ruling.

All industries located farthest from distribution points, particularly those in New England, and in the Northwest, were found to be not only well stocked, in accordance with Fuel Administration specifications, but in many cases to have surpluses above those amounts.

Population Congested in Anthracite Consuming States

Detailed statistics of the influx of population to the now congested area of the northeast would undoubtedly show that millions of persons have moved from other sections, since the beginning of European hostilities, to industrial centers in the anthracite consuming region.

A table, prepared last year by the Provost Marshal General in connection with application of the selective draft law, showed an increase in population of nearly five millions at that time over the figures of 1910, for states of the northeast where large war industries are located. The figures are:

	1910	1917		1910	1917
Connecticut	1,114,756	1,719,623	New York.........	9,113,614	11,187,798
Delaware	202,322	234,710	Pennsylvania	7,665,111	8,981,082
Dist. of Columbia..	331,069	346,856	Rhode Island......	595,986	573,583
Maine	742,371	646,588	Vermont	355,956	296,426
Maryland	1,295,346	1,292,091	Totals	28,077,580	32,877,609
Massachusetts	3,693,310	3,939,561			28,077,580
New Hampshire....	430,572	403,884			
New Jersey.......	2,537,167	3,255,407	Total increase.		4,800,029

GOVERNMENT INTERESTED IN "CARBOCOAL"

Following tests made of "Carbocoal" by the U. S. Navy and two railroads, the Government has become interested in the establishment of a plant for manufacture of the product at Clinchfield, Virginia. The plant, which is expected to be in operation early in 1919 will have a capacity of treating several hundred thousand tons of bituminous coal annually. The plans for the plant and the grounds allow for an eventual capacity of 1,500,000 tons per year.

By a new process of low temperature distillation, bituminous coal is treated in such a manner as to recover greater quantities of the valuable by-products, such as toluol, sulphate of ammonia and valuable oils. From the residue is made a valuable smokeless fuel, in the form of briquettes. Tests of "Carbocoal" by the Navy disclose that it contains less than four per cent. volatile matter, rendering it practically smokeless. Moreover, it is found to work satisfactorily where there is limited grate area and restricted boiler capacity.

COAL RESERVES OF THE WORLD

Showing number of tons of the supply in each country; also number of tons of each one of the three grades, and percentages in all cases. (All figures represent billions of 2,000-lb tons, i.e., 000,000,000's omitted.)

(Compiled from several tables in Report of Twelfth International Congress, held in Toronto, Can., in 1913 (3 vols.), "The Coal Resources of the World.)

Countries	Total Reserves of all Grades Billion Tons	Total Reserves of all Grades Per Cent. of Total	Anthracite, inc. Some Dry Coals Billion Tons	Anthracite, inc. Some Dry Coals Per Cent. of Total	Bituminous Two Grades Billion Tons	Bituminous Two Grades Per Cent. of Total	Sub-Bituminous and Lignite Billion Tons	Sub-Bituminous and Lignite Per Cent. of Total
United States, inc. Alaska	4,231	52.0	22	4.0	2,155	50.1	2,054	62.2
Canada	1,361	16.7	2	.4	313	7.3	1,046	31.6
China	1,097	13.4	427	77.9	670	15.6	....	....
Germany	467	5.7	...	....	452	10.5	15	.5
Great Britain	209	2.6	12	2.3	197	4.6	....	....
Siberia	192	2.3	...	....	73	1.7	119	3.6
Australia	183	2.2	...	....	146	3.4	37	1.1
India	87	1.1	...	....	84	2.0	3	.1
Russia, Europe	66	.8	41	7.6	23	.5	2	.1
Union, S. Africa	62	.8	13	2.4	49	1.1	....	....
Austria	59	.7	...	....	45	1.0	14	.4
Colombia	30	.3	...	....	30	.7	....	....
Indo-China	22	.3	22	4.0	....	....	....	....
France	19	.2	4	.6	14	.3	1	.1
Belgium	12	.2	...	....	12	.3	....	....
Spain	10	.1	2	.3	7	.2	1	....
Spitzbergen	9	.1	...	....	9	.2	....	....
Japan	9	.1	...	....	8	.2	1	....
Holland	5	.1	...	....	5	.1	....	....
Other Countries	24	.3	3	.5	10	.2	11	.3
Total res.	8,154	100.0	548	100.0	4,302	100.0	3,304	100.0

CLASSIFICATIONS OF COAL

The Geological Survey gives to coal six classifications. They are: Anthracite, semi-anthracite, semi-bituminous, bituminous, sub-bituminous, and lignite. All of these various classes are produced in the United States.

Most anthracite coal is mined in Eastern Pennsylvania. Small areas of coal exist in the West that are placed in the anthracite classification, but which are not identical in quality with the Pennsylvania anthracite. Anthracite is an almost ideal domestic fuel, but is not well adapted to steam raising, although used for this purpose when an absolutely smokeless fuel is required.

There is little semi-anthracite in this country, hence a small factor in the trade.

Semi-bituminous is of higher rank than bituminous. It has a high percentage of fixed carbon, which makes it nearly smokeless. It is best adapted to raising steam and to general manufacture that requires a high degree of heat. It is regarded as the best coal for steamships, and is used almost exclusively by the Navy. Being of a soft, tender quality, it is easily broken. This fineness is regarded by those accustomed to lump coal as detrimental, but it is not. It burns slowly and retains a high degree of heat.

Bituminous coal is produced in a number of grades, but, generally speaking, it describes coal having about equal proportions of volatile matter and fixed carbon. Bituminous coal is only slighty affected chemically by weathering unless it is exposed for many years. Cannel coal is classed as bituminous.

"Sub-bituminous" is a term adopted by the Geological Survey to describe a rank of coal more generally known as "black lignite." It is produced principally in the Western States. It is a clean, domestic coal, and ignites easily.

Lignite is a product of North and South Dakota, and Texas. It is heavy in moisture when it comes from the mines, but dries quickly when exposed to the weather. Lignite is marketed mainly at points near the mine as a domestic fuel.

ORIGINAL AND PRESENT SUPPLY OF COAL IN U. S.

(Within 3,000 feet of the surface)

Number of net tons of each grade in each of the coal areas, within 3,000 feet of surface, and total exhaustion to date. Table prepared from estimates made by Geological Survey. (Expressed in millions of tons, i. e., 000,000's omitted.)

PROVINCE	Anthracite and Semi-anthracite Million Tons	Semi-bituminous and Bituminous Million Tons	Semi-bituminous and Lignite Million Tons	Totals of all Grades Million Tons	Remaining Supply at end of 1914 Million Tons
EASTERN. (Penna., Atlantic Coast and Appalachian regions)	21,150	*48,637 †503,012	....	572,799	561,032
INTERIOR. (Mich., Ill., Ind., W. Ky., Iowa, Kans., Okla., Mo., Ark, & S. W. regions)	400	*1,226 †528,273	....	529,899	527,874
GULF. (Mined only in Texas, but deposits extend north to Cairo, Ill., and east to Ala.)	.....	......	§23,090	23,090	23,074
NORTHERN GREAT PLAINS. From N. Dak. and Montana south to N. Mex., inc. Denver and Raton Mesa regions)	.....	†45,553	‡284,548 §964,424	1,294,525	1,204,180
ROCKY MOUNTAIN. (Includes Bighorn, Wind River, Hams Fork, Green River, Uinita, S. W. Utah and San Juan River regions)	503	†354,640	‡713,283	1,068,426	1,067,609
PACIFIC COAST. (Chief field is in Washington)	.....	†11,439	‡53,459	64,899	64,785
Totals	22,053	*49,863 †1,442,916	‡1,051,290 §987,514	3,553,637	3,538,554

* Semi-bituminous. † Bituminous. ‡ Semi-bituminous. § Lignite.

NOTE: Total production to end of 1914 was 10,357,700,000 tons which was assumed to mean an exhaustion of approximately 50 per cent. more or 15,083,000,000 tons. The production since 1914 to the end of 1917 has been 1,773,000,000 tons, and adding for exhaustion, a total is reached of about 2,554 million tons to be deducted from total of the last column of the foregoing table, leaving gross coal resources of the United States at the beginning of 1918 about 3,536,000,000,000 short or net tons, according to the best estimates available. Therefore, in the 111 years since 1807 that mining has been conducted, the exhaustion has been about half of one per cent.; but more than half has been in the last twelve years.

COAL PRODUCED BY IMPORTANT COAL-MINING COUNTRIES

	Net Tons 1913	Net Tons 1914	Net Tons 1915	Net Tons 1916	Net Tons 1917
United States	569,690,219	513,525,477	531,619,487	590,098,175	651,402,374
Great Britain	321,922,130	297,698,617	283,560,980	287,118,153	*278,289,893
Germany	305,714,664	*270,594,952	*258,590,094	....	....
Austria-Hungary	60,575,201	*53,396,400	*52,679,712	*55,482,000	....
France	45,108,544	32,765,156	*21,899,781	*24,040,000	*30,800,000
Russia	35,500,674	36,414,560	31,158,400	33,550,000	....
Belgium	25,196,869	*19,000,000	*15,691,465	....	....
Japan	23,988,292	21,700,572	22,539,822	25,237,541	....
India	18,163,856	18,439,975	18,673,98b	18,389,372	....
China	15,432,200	*10,199,200	*19,800,000	....	....
Canada	15,115,089	13,637,529	13,267,023	14,483,395	....
New South Wales	11,663,865	11,644,476	....	9,102,420	....
Spain	4,731,647	4,877,141	5,155,428	6,055,727	....
Union of S. Africa	....	9,461,674	9,275,083	11,208,402	....
New Zealand	2,115,834	2,548,664	2,473,659	*2,941,500	....
Holland	2,064,608	2,121,394	2,488,363	....	....
Chile	1,362,334	....	....	....	....
Queensland	1,162,497	1,180,825	1,137,186	....	....
Italy	772,802	859,516	1,045,256	....	....
Victoria	668,524	691,644	....	468,270	....
Dutch East Indies	453,136	626,351	485,158	539,816	....
Orange Free State	609,973	699,217	727,557	....	....
Indo-China	....	608,660	708,800	*855,555	....
Peru	301,970	317,923	323,680	....	....
Sweden	401,199	404,146	457,184	....	....
W. Australia	351,687	357,526	321,065	....	....

* Estimated.

NOTE: Approximate total for the world is 1,346,000,000 net tons, of which the United States in 1917 produced nearly one-half.

COAL PRODUCTION IN 1917 AND 1916

THE production of bituminous coal in 1917 was 551,790,563 net tons, an increase over 1916 of 49,270,881 tons, or nearly 10 per cent., according to C. E. Lesher, of the Geological Survey. The production of Pennsylvania anthracite in 1917 established a new high record of 99,611,811 net tons (88,939,117 gross tons), exceeding that in 1916 by 12,033,318 net tons, or nearly 14 per cent. Following is a comparative table by states given in order of rank in 1917:

	1917			1916		
		Number of men			Number of men	
State	Total (net tons)	Under ground	Total	Total (net tons)	Under ground	Total
Penna. (bitum.)	172,448,142	143,687	173,968	170,295,424	139,186	168,212
West Virginia	86,441,667	69,155	88,422	86,460,127	64,618	78,067
Illinois	86,199,387	75,085	84,090	66,195,336	68,127	75,538
Ohio	40,748,734	38,569	45,509	34,728,219	36,680	41,394
Kentucky	27,807,971	28,162	34,926	25,393,997	26,501	31,222
Indiana	26,539,329	22,664	26,528	20,093,528	20,992	23,965
Alabama	20,068,074	22,925	28,386	18,086,197	21,453	25,308
Colorado	12,483,336	11,285	14 231	10,484,237	10,456	13,104
Virginia	10,087,091	8,607	11,168	9,707,474	7,359	9,777
Iowa	8,965,830	12,672	14.266	7,260,800	12,960	14,443
Wyoming	8,575,619	6,024	7,358	7,910,647	6,041	7,255
Kansas	7,184,975	8,816	10,680	6,881,455	10,325	12,132
Tennessee	6,194,221	8,053	10.421	6,137,449	7,661	9,211
Missouri	5,670,549	7,680	9,668	4,742,146	7,847	9,654
Maryland	4,745,924	4,696	5,919	4,460,046	4.719	5,633
Oklahoma	4,386,844	7,017	8,495	3,608,011	6,620	7,800
Montana	4,226,689	3,338	4,149	3,632,527	3,065	3,781
Utah	4,125,230	2,569	3,485	3,567,428	2,397	3,129
Washington	4,009,902	4.072	5,312	3,038,588	3,764	4,797
New Mexico	4,060,527	3,191	4,126	3,793,011	3,304	4,522
Texas	2,355,815	3,683	4,375	1,987,503	3,901	4,481
Arkansas	2,143,579	3,135	3,998	1,994,915	3,055	3,772
Michigan	1,374,805	2,154	2.406	1,180,360	2,124	2,535
North Dakota	790,548	619	821	934,912	553	714
Georgia	119,028	205	281	173,554	322	411
Alaska	53,955	*	*	13,073	69	83
Oregon	28,327	77	104	42,592	78	106
South Dakota	8,042	34	34	3,886	26	38
California and Idaho	6,423	11	17	7,240	11	18
Total bituminous	551,790,563	498,185	603,143	502,519,682	474,244	561,102
Pennsylvania anthracite	99,611,811	109,989	154,174	87,578,493	116,705	159,869
Grand total	651,402,374	608,174	757,317	590,098,175	590,949	720,971

* Not available.

It is interesting to note that the preliminary estimate of the production of bituminous coal, published by the Geological Survey in the first week of January, 1918 (544,000,000 net tons), was low, because it was based on the number of carloads of coal loaded at the mines, whereas the average loading per car had increased nearly 4 per cent. during the year, a fact not discovered until several months after the estimate was made.

COKE PRODUCTION IN 1917 AND 1916

The production of coke in 1917 was 55,606,828 tons, an increase compared with 1916 of 1,073,243 tons, or 2.0 per cent.

The output of by-product coke increased from 19,069,361 tons in 1916 to 22,439,280 tons in 1917 and represented 40.4 per cent. of the total in 1917 against 35 per cent. of the total in 1916.

The production of beehive coke decreased from 35,464,224 tons in 1916 to 33,167,548 tons in 1917.

The number of active by-product ovens increased from 6,607 in 1916 to 7,298 in 1917, and of beehive ovens from 65,605 to 68,687, but the irregularity of operation of beehive ovens in 1917, due principally to lack of railroad cars, reduced the average production per oven.

ANALYSIS OF COAL PRODUCTION IN UNITED STATES

By periods and decades since 1807, and by years since 1908, showing more production in last 12 years than all time before.

Years (Inclusive)	Pennsylvania Anthracite	Bituminous	Total Net Tons	Period Totals
1807 to 1820	12,000	3,000	15,000	
1820 to 1825	71,141	256,040	327,181	
1826 to 1835	3,007,371	1,160.778	4,168,149	
1836 to 1845	13,393,484	9,784.153	23,177,237	End of 1865:
1846 to 1855	51,948,337	31,469,490	83,417,827	284,900,808.
1856 to 1865	98,593.540	75,201,474	173,795,014	1807-1885:
1866 to 1875	198.436,722	220,988,382	419,425,104	1,552,086,231.
1876 to 1885	309.991,788	537,768,531	847,760,319	1807-1905:
1886 to 1895	486,784,754	1,099,313,887	1,586,098,641	5,970,587,618.
1896 to 1905	612.395,214	2,220,007,532	2,832,402,746	
1906 to 1915	851,878,227	4,066,839,056	4,918,717,283	
PRODUCTION DURING LAST TEN YEARS				
1908	83,268,754	332,573,944	415.842,698	
1909	81,070,359	379,744,257	460,814.616	
1910	84,485,236	417,111,142	501,596,378	
1911	90,464,067	405,907,059	496,371,126	12 Year Total
1912	84,361,598	450,104,982	534,466,580	1906 to 1917:
1913	91,524,922	478,435,297	569,960,219	6,153,543,458.
1914	90,821,507	422,703,970	513,525,477	6,160,217,832.
1915	88,995,061	442,624,426	531,619,487	
1916	87,578,493	502,519,682	590,098,175	
1917	99,611,811	551,790,563	651,402,374	
Total, 1908-1917	882,181,808	4,383,515,322	5,265,697,130	
Total, 111 years, 1807-1917	2,813,702,882	9,317,102,508	12,130,805,450	

NOTE: Anthracite production exceeded that of bituminous until after the Civil War. Since that time it has grown less and less, proportionately, from year to year. Ten years ago the proportionate increase of bituminous production had reached a point about four times as great as anthracite, and last year the production of bituminous had become nearly six times as much as that of anthracite. This is illustrative of the tremendous increase of American industries, which absorb nearly all of the bituminous production.

HEAVY PENALTIES ASSESSED

Heavy penalties were assessed on September 12, 1918, against a Philadelphia coal company for admitted gross violations of the rules and regulations of the Fuel Administration. Complaints had been received that many operators and distributors had been exacting from consumers who desire coal for steam purposes, the higher prices permitted for smithing coal. Evidence disclosed that this company was one of the most flagrant offenders.

The License Board ruled that the company should contribute $25,000 to the Red Cross, also that all commissions, margins or profits made by the company between September 15 and October 1, should be paid by it to the Red Cross. During that period a representative of the Federal Fuel Administrator of Pennsylvania supervised all business of the company. This, in effect, suspended the license of the company without disturbing the distribution of coal to customers.

The company was also required to refund to any persons, firm, association or corporation which purchased, through it or from it, smithing coal which was not used exclusively for smithing purposes, the difference between the price paid for such smithing coal and the applicable government mine price for ordinary bituminous coal at the date of shipment, provided such purchasers demand the refund within six months. Purchasers asking for refunds must, however, establish to the satisfaction of the Legal Bureau of the Fuel Administration that the violations of the regulations involved were not the result of connivance and participation therein by the purchasers.

COAL SAVING IN THE HOME

HOW to get more heat out of coal than the chimney does, is the most important branch of household economy. In the average home 25 per cent. of coal used can be saved. Most of this can be accomplished by PROPER DAMPER CONTROL. G. L. Larson, University of Wisconsin, in discussing the possible percentage of saving, says:

> Tests have shown that from 40 to 50 per cent., on the average, of the heating value of the coal is usefully employed in heating a house or a building. Under conditions of proper installation and frequent and careful attention, 50 to 60 per cent. of the heating value may be converted into useful heat.

An important general rule is emphasized by L. P. Breckinridge, of the Sheffield Scientific School of Yale, thus:

> The flow of air through the fuel makes it burn. Learn to control it. Try to visualize this flow of air through the fuel and you will easily learn how to operate the dampers to control it properly. . . . The draft of the chimney is much diminished when by opening the check-damper cold air is allowed to flow directly into the chimney.

The Fuel Administration can make a family *more* comfortable with *less* fuel, if the head of the house will operate his heater and range properly. First, the heater must be CLEAN. A thin layer of soot has as much heat resistance as ten inches of iron.

The Fuel Administration asks the head of each household to get from every ton of coal every unit of heat it can supply. Give your heater a cleaning and have it put in thorough repair. Broken parts mean loss of heat. The fire-box should be tight. Trivial cracks may be cemented. If the landlord refuses to make repairs the householder should report the matter to his local or State Fuel Administrator.

COKING METHOD OF FIRING IN HOME HEATERS

For Bituminous (Soft) Coal Only

TO THOSE living in sections of the country which do not receive as much anthracite this year as they have heretofore, because of transportation conditions, the following instructions concerning use of bituminous coal should be of special interest:

Only small quantities should be fired at one time. Red hot coal should not be smothered with fresh coal. This would cause the gases to be given off so rapidly that they would not be properly burned. If possible, the volatile matter from fresh coal should pass over the glowing coal.

In fire-box boilers push the live coal to the back part of the furnace, and then fill up the front part of the grate with fresh coal. Ignition then takes place gradually from the back toward the front, the fire spreading over the top of the coal and consuming the volatile matter, and reducing or preventing the formation of soot and smoke. When the volatile matter has been distilled from this fresh charge, it should in turn be pushed back and more fresh coal added in front as before.

Any form of fire-box which permits alternate feeding of coal at one end, and then at the other will greatly reduce the amount of soot formed; for instance, in the kitchen range, if the live coals are at one end and the fresh coals at the other end of the fire-box, the combustion of the volatile matter will always be more complete than if the fresh coal is thrown upon the glowing coal.

For round, hot water, or steam heating boilers, and hot air furnaces, a modification of the same coking method can be used. Upon opening the fire door of the round furnace, one side of the fire will generally be lower than the other. This low side should be cleaned out nearly down to the grate, banking the live coal on the other side of furnace. The low side of furnace is then filled with fresh coal.

A level, even fire should be kept at all times, and holes should not be allowed to form in the fuel bed. The fire should not be raked or stirred excessively, and the poker should be used only when it is necessary to break or crack clinkers or any coke that may have formed.

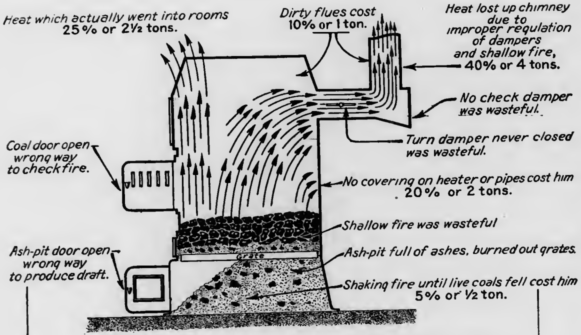
CARE OF GRATES IMPORTANT

Grates require intelligent attention to keep them in good condition.

Damaged grates in heaters and ranges are coal and heat wasters. With proper care, grates will last almost as long as the heater or range. If abused they will burn out or warp. Then it is necessary to purchase new ones. Following are suggestions on the care of grates:

1. Grates should be left in a flat position. This means that no part of them should protrude into the fire bed, except when shaking.
2. To sift the ashes through the grates, use a short, quick stroke of the shaker. If the grates become stuck in this operation, do not use force to free them. In such cases it is likely they have become clogged with a stone or clinker.
3. It is most important to keep the ash-pit clean. Ashes beneath the grates cut off the air supply. In this condition the grates will soon become warped or burned out.
4. A bed of ashes should be kept on top of the grates, reducing it in size as the weather grows colder. This practice will also help to avoid burning out the grates, and will save fuel.
5. Grates should never be shaken until live coals fall through. In severe weather the grates should be shaken only until a glow appears in the ash-pit. In mild weather there should be no glow in the ash-pit.

(How to Save Coal in the Home—Continued on following pages.)



THE STORY OF COAL WASTED AND MONEY LOST

The wasteful coal user bought 10 tons, costing at least $100. Of this amount, $75 worth was wasted and he got heat from only $25 worth. He lost $40 because he either did not have, or did not use the check draft damper and turn damper; and he let most of the heat up the chimney. His heater and heater pipes were not covered with asbestos, causing a $20 loss; $10 was wasted because smoke pipe and heater flues were not clean of soot; $5 was wasted, because when shaking fire he allowed live coals to fall into ash pit. He opened the coaling door to check fire, which was absolutely wrong.

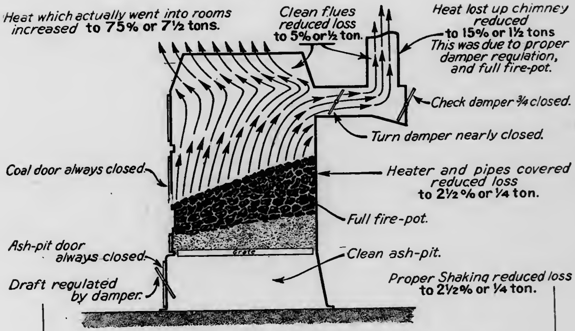
GENERAL RULES

For Hot-Air, Steam, or Hot-Water Plants, or Kitchen Ranges

1. There must be a CHECK DRAFT-DAMPER IN THE SMOKE-PIPE, besides the turn-damper. This check draft-damper controls the rate at which the fire burns as the throttle controls an engine. Open it to check fire. Close it to increase draft. Experiment with it. Make it do its work. Don't open coaling-door. If you cannot check draft without opening coaling-door, you need proper dampers.

2. The turn-damper should fit smoke-pipe loosely. With the average heater it should be kept nearly closed.

3. Just enough draft and that from below, checking draft by LETTING MORE AIR INTO SMOKE-PIPE, is one of the best general rules. The air from below furnishes oxygen, necessary for consumption of gases, and gives time for them to burn before being drawn up chimney. This method also avoids escape of coal gas into cellar. To increase draft open only the draft-damper in ash-pit door. Opening the whole ash-pit supplies air faster than needed. The air is heated, passes up chimney and is heat wasted.



THE STORY OF COAL SAVED AND MONEY SAVED

The householder who efficiently operated his heater ordered ten tons of coal, cost $100. Of this he received $75 worth of heat; only $25 was used in creating draft. Little better can be expected. To accomplish this, he learned how to use the draft damper and the turn damper, cutting chimney losses. He covered heater and heater pipes with asbestos, utilizing much heat. He shook his fire only until a glow appeared in the ash pit—not allowing hot coals to drop. He cleaned smoke pipe and heater flues of soot and kept coaling door closed, except when putting on coal.

4. Make use of damper in coaling-door ONLY TO LET OXYGEN IN TO CONSUME GASES, if you use soft coal, after fresh fuel has been added.

5. Grates should be cared for diligently. A short, quick stroke of shaker will sift ashes through the grates. Clean ash-pit daily, to prevent damage to grates. In severe weather, shake only until a glow appears in ash-pit. In mild weather leave bed of ashes on top of grates. Leave grates in flat position when through shaking. Avoid poking fire-bed. It causes draft holes and clinkers. Never shake a low fire until you put on a little fresh coal and give it time to ignite.

6. All heat pipes in cellar should be covered with asbestos or similar material. Weather-strips, storm windows and doors save heat.

7. Turn off heat in unused rooms. Bedrooms should be much cooler than living rooms. Don't try to heat all rooms all the time. If you have a hot-water system, make heavy radiator slip-covers and put over radiators not in use, to prevent freezing. Leave valve open.

8. Place pans or open-top jars of water on radiators or in front of registers to help keep air in the home moist.

Study rules applying to system in your house. Sift the ashes.

HOT-AIR FURNACES—SPECIFIC RULES

1. Regulate window of cold-air box so as avoid too great a current of outside air, especially on very cold days. Recirculation of air from lower floors is advisable.

2. Keep water container in air-jacket filled. Set jars of water near registers that send out most heat.

3. Hot-air pipes should pitch well upward from furnace, should be of sufficient diameter, and should be wrapped with asbestos or similar material. A separate pipe for each room with a turn damper near furnace is a good rule. Label each pipe so that certain rooms can be shut off at furnace when desired.

4. Have fire-box gas-tight. All cracks must be cemented or a new section put in. Otherwise coal-gas will be carried to the rooms.

Study General Rules. Notice the "clean-out" door.

STEAM HEATERS—SPECIFIC RULES

1. Look at glass water-gauge whenever you attend fire. Turn cocks above and below gauge occasionally to make sure openings to it from boiler are not clogged. Keep water gauge half full of water. More than half uses steam space. Less than half may damage heater.

2. If you have not good air valves, get the best at once. They are the greatest source of trouble on steam heating plants.

3. Boiler and cellar pipes should be covered.

Study General Rules. Keep boiler-flues clean.

HOT-WATER PLANTS—SPECIFIC RULES

1. Water should be emptied from plant and clean water put in every spring.

2. All radiators must be entirely filled with water. Open air valves frequently, especially on top floor, until water flows. If no water appears, put more into system. Expansion tank should not be more than half full.

3. Have boiler and cellar pipes covered.

Study General Rules. Keep heating surfaces clean.

KITCHEN RANGES—SPECIFIC RULES

1. A range needs little shaking. Clean ash-pit daily to prevent damage to grates.

2. When fire is low, put on a little fresh coal and give it time to ignite before shaking. Don't poke the fire.

3. If lid must be removed to check fire, take off lid farthest from fire-box. Never remove lid directly over fire.

4. Clean entire stove inside, frequently and thoroughly, particularly under oven and on top of oven.

5. Keep fire-box full to oven top.

6. Keep kettle of water on stove, to make the air moist.

Study General Rules for all household coal-burners.

NEED FOR ANTHRACITE CONSERVATION

On November 20th, the Fuel Administration announced that the production of anthracite coal had decreased 1,500,000 gross tons (1,680,000 net tons) because of the epidemic of influenza and the two celebrations of the signing of the armistice. The share that influenza had in the total falling off was estimated to be at least 1,000,000 gross tons.

The day previous, a meeting of operators, distributors and Fuel Administration officials was held at Philadelphia, and the great importance of continued efficiency and energy in completing the distribution of available anthracite stocks was emphasized. In this connection, consumers who had laid in a portion of their winter's supply were urged to exercise every means of conserving it in order that those less fortunate would be relieved during the cold winter months.

The Fuel Administration called attention to the delay on the part of many small industrial consumers, as well as householders, in laying in their coal where sufficient quantities were available to meet demands and to the possibility of a shortage arising when they sought to fill their bins. If production should continue to decrease, or even if it should remain stationary, and a sudden cold spell come on, it was feared that the situation would become acute in certain sections.

In its appeal for conservation, the Fuel Administration found a gratifying response in many sections to its appeal for the use of No. 1 buckwheat anthracite coal. Those unfamiliar with the best system for utilizing buckwheat coal with the larger sizes of anthracite will obtain good results by observing the following rules, which apply to all household heating systems:

How To Use 75 Per Cent. Egg and 25 Per Cent. No. 1 Buckwheat

At night, after the fire is shaken down and some of the larger coal put on, the fire can be banked for the night by shoveling on a top dressing of No. 1 buckwheat.

This top dressing tends to hold the draft and aids in the proper and economic combustion of the coal body as a whole.

In the morning, at least in mild weather, the furnace should be shaken down as usual and fired with some of the regular coal.

After the fire has begun burning well it can be checked or banked by using a quantity of the fine coal as a top dressing.

The two sizes of coal never should be mixed, but kept in separate bins. The buckwheat should be used only as a top dressing, and should not be used except with the larger sizes of anthracite.

The ordinary furnace does not have sufficient draft to produce satisfactory results when Buckwheat is used with either chestnut or pea coal.

(Continued on page 36)

(*Continued from page* 35)

The exact proportion of small and large coal should be determined by experience and by weather conditions.

How To Use 60 Per Cent. Egg and 40 Per Cent. Pea Coal Mixed

Keep the egg and pea coal in separate bins.

If you have a good bed of fire, put the egg coal on first and then add a smaller amount of pea coal.

If the fire is low, put on a little pea coal, and after a good bed of fire is formed, add the egg and pea coal as above.

How To Burn 100 Per Cent. Pea Coal in Heater and Range

Always carry a layer of ashes on the grate to prevent the coal from falling through.

Shake the grates with short strokes—just enough to remove most of the ashes; leave a layer on the grate.

Then slightly loosen the fire, with a poker, so that the air can pass up through it.

Allow the fire to burn up brightly; then add a little coal.

Allow fire to burn rather freely for about fifteen minutes; then fill the fire box with coal almost to bottom of coaling door.

If you change your order, or at least part of it, to egg and pea, or egg and No. 1 buckwheat coal, you will get quicker delivery, as well as save money.

SAVING GAS IN THE HOUSEHOLD

ARTIFICIAL gas is such a convenient fuel that it is easily wasted. It requires coal and oil for its manufacture. A waste of gas is therefore a waste of coal and oil and a waste of transportation.

Economy in the use of gas for cooking, for heating of rooms, and in the use of hot water supplied by gas water heaters will go far toward fuel conservation.

Have your plumber place a self-closing faucet on the kitchen hot water supply. You will soon save enough to pay the plumber's bill and contribute substantial help toward saving fuel.

Learn to read your own gas meter. It is a simple matter and easily accomplished. If you have any difficulty in reading it ask the gas man on his next visit to show you how. Keep a record of the meter figures every week and make careful comparison to see how much gas you are saving.

Visit the local gas company's office occasionally and obtain any advice you desire.

Economies in Use of Gas Range

In cooking with gas there are many ways of avoiding unnecessary waste. When water reaches the boiling point in a receptacle over a gas flame, it is a waste of fuel to keep the burner open wide. Very little flame is required to keep the water boiling.

Always make use of a burning flame. Don't let it burn while preparing to use it.

Be sure the flame is blue. If it gets yellowish, the mixing chamber in front of gas cock probably needs cleaning and readjusting.

Frequently, holes in the burners become clogged, and they should be cleaned. A full spread of short flames is better than an incomplete spread of long flames.

Too much gas is used in most cooking operations. If there is a hissing or roaring sound, adjust the gas cock to reduce the flow.

Fireless cookers are convenient and save much gas.

Economical Use of Gas Lights

USE INCANDESCENT BURNERS INSTEAD OF ORDINARY FLAT-FLAME BURNERS. Five incandescent burners substituted for flat-flame burners in use four hours a day, will save, in one year, approximately one ton of fuel. By using incandescent burners in place of open-flame burners you can obtain twice the amount of light at half the cost.

BROKEN MANTLES SHOULD BE REPLACED WITH NEW ONES. The broken mantle uses as much gas but gives half the light and is therefore a coal-waster.

HAVE A CHAIN-PULL BY-PASS ON ALL GAS FIXTURES in order that gas may be relighted instantly without bothering to hunt up a match. Without this attachment few people take the trouble to turn out gas lights when leaving the room for a short time.

Use of Gas Water Heaters

Gas water heaters are of two classes, those in which the gas must be lighted for a short period before the hot water is required, and the automatic heaters. Either kind, to be efficient, must be kept thoroughly cleaned. Soot must not be permitted to accumulate on the coils and in the burners. Watch out that the flame is always blue.

The automatic heaters are extremely convenient and, like many other comforts and luxuries, are expensive.

In a household where hot water is used lavishly it is surprising how much can be done without and still maintain a high degree of cleanliness and hygiene. Many people enjoy and benefit from a daily cold "tub," but if you must have warm water when bathing it need not be "hot," nor must the bath tub be full.

A great deal of hot water is wasted in many kitchens. The hot water is drawn upon many times a day for purposes for which cold water will serve just as well.

Frequently the hot water faucet is used to obtain a very small quantity of hot water, and if the water comes from an automatic heater the amount of gas which must necessarily be consumed in the heater to heat up the contents of the piping system between the heater and the faucet is out of all proportion to the service rendered.

Other Gas Appliances

There are many appliances used for heating rooms, such as gas logs, gas grates, radiators, etc. The same admonitions to householders to be sparing in the use of coal for house heating, to avoid heating unnecessary or infrequently occupied rooms, to maintain lower room temperatures, etc., apply equally well to the use of gas heaters.

The greater expense of heating by means of artificial gas compared with coal in most cases should prove a sufficient incentive to use these heaters sparingly. In a great many cases during the early fall and late spring the chill can be taken off the atmosphere of the living rooms, if there is a hot air plant, by burning a little rubbish in the furnace instead of lighting a gas heater.

ELECTRIC LIGHT SAVING

Every moment your electric light is turned on, you are using power derived directly from coal; that is, unless your electric light company is fortunate enough to obtain its current through water power. Much coal can be saved by careful attention to electric lights, and by observing a few rules regarding them.

You should not, however, save light at the expense of eyesight.

Better light, smaller bills and saving of fuel are the results of efficient illumination.

All lights used for merely decorative purposes should be eliminated.

Remove all bulbs having broken filaments. The broken filament uses twice as much current. Inspect all bulbs at least once a month.

Keep the bulbs clean. Finger-marked or dusty bulbs absorb light.

Lights should be turned out upon leaving an unoccupied room.

Lamp shades and all globes should be of translucent material.

Light wall papers should be substituted whenever possible for dark ones; light colors absorb less light than the dark ones.

Daylight should be used to the fullest extent.

MODERATE TEMPERATURES, WITH MOISTURE, HEALTHFUL

Professor Ellsworth Huntington, of Yale University, in an article entitled "Save Coal and Save Health," in the September, 1918, issue of "The American Review of Reviews," sets down these three facts:

1. An average temperature of 64 degrees is the best for the human race.
2. Moist air is more healthful than dry, provided it is not too warm. Such air feels warmer than dry air at the same temperature and retains its heat longer.
3. Variations of temperature are much more healthful than a uniform temperature. As a means of preserving health few things are better than a frequent fall of temperature followed by a more gradual rise.

He points out that summer heat is more fatal than winter's cold, yet the winter death rate is higher because of artificial conditions.

"Save coal and you will save health," he says. "The shortage of coal will actually improve our health. With better health we shall have fewer doctor's bills.

NATURAL GAS BECOMING SCARCE

Demands for natural gas are greater than the available supply. When present supplies are exhausted, we must go back to the more expensive manufactured gas. The use of natural gas is a privilege enjoyed by about 10% of our population, and not appreciated until it is gone. Following are some simple rules on saving of natural gas:

Be careful not to light gas for cooking until you have utensil ready for use, and turn off immediately when cooking is completed.

Gas should not be used at high pressure and long flames. Short flames, if properly directed, consume less gas for the same cooking operations.

Be careful not to leave the gas high after boiling begins. At boiling point the same temperature can be maintained with smaller gas consumption.

Keep living rooms at not over 68 degrees. Lower temperature by turning down gas, rather than by opening doors and windows.

You should not burn gas in a furnace without automatic thermostat control. Such an automatic device prevents heating and waste of gas.

Take care that the hot water tank flame is no higher than necessary.

POWER USED IN THE UNITED STATES

Condensed table from "Electric Power Development in the United States," a report of January 17, 1916, by the Secretary of Agriculture to the Senate. The figures are from census taken in 1912, and all power is included except that used on steam railroads.

Kind of Power	Total No. of Horse-power in use	Per Cent of Total	Horse-power used in Manufactures	Per Cent of Total	Horse-power used in Public Utilities	Per Cent of Total	Horse-power used by Electric Railways	Per Cent of Total
Steam	24,339,819	80	16,233,733	53.3	4,946,532	16.3	3,169,554	10.4
Water	4,870,320	16	1,927,932	6.4	2,471,081	8.0	471,307	1.6
Gas and oil..	1,238,107	4	1,102,882	3.5	111,035	.4	24,190	.1
Total primary power in use..	30,448,246	100	19,254,547	63.2	7,528,648	24.7	3,665,051	12.1

During the same year (1912) the country produced 450,104,982 tons of bituminous coal and 84,361,58 tons of anthracite, of which about one-third, or 178,000,000 tons, was used in the development of industrial steam-power. Practically no coal is used in development of water-power or gas and oil-power.

Steam railroads the same year used about 125,000,000 tons and steamships about 10,000,000 tons, while in steam heating plants about 70,000,000 tons were used. About 70 per cent. of coal each year is used in peace times in steam making, and the balance in hot-air and hot-water plants, cook stoves, the making of coke and gas and exportations.

HYDROELECTRIC POWER DEVELOPMENT

A general development of facilities for generation of electric energy by water power and substitution of such energy for that derived from steam wherever practicable is strongly urged by eminent engineers. It is axiomatic that utilization of water powers would conserve much fuel.

One of the most striking illustrations of the saving in coal effected by the installation of hydroelectric plants is contained in a statement by coal men that the annual consumption of coal in St. Louis was reduced by that means between 1,000,000 and 1,500,000 tons.

Western States have gone much further than those of the East in the development of their water powers. Large amounts of power can be developed in the West at a cost which compares more favorably with steam power than is the case in the East.

The superiority of electric over steam locomotives under certain conditions has been demonstrated in a number of cases, particularly on the Chicago, Milwaukee & St. Paul Railway and on the Norfolk & Western Railway. On the "Elkhorn Grade" of the latter road, which is now electrified, two electric locomotives haul at the rate of 14 miles an hour a freight train which formerly three powerful steam locomotives were unable to haul at a speed greater than 7 miles an hour.

The Geological Survey has estimated the potential water power of the United States under conditions of minimum and maximum flow, exclusive of the increase which could be brought about by the construction of reservoirs. Those estimates have been tabulated with reference to geographical subdivisions of the country as follows:

Group of States	Estimated Minimum Horse-power	Per Cent	Estimated Maximum Horse-power	Per Cent
New England	868,000	3.11	1,605,000	2.98
Middle Atlantic	1,357,000	4.86	2,488,000	4.62
East North Central	832,000	2.98	1,604,000	2.98
West North Central	902,000	3.23	1,956,000	3.63
South Atlantic	2,346,000	8.39	4,257,000	7.90
East South Central	1,087,000	3.89	1,964,000	3.64
West South Central	353,000	1.26	822,000	1.52
Mountain	8,694,000	31.11	16,131,000	29.92
Pacific	11,504,000	41.17	23,078,000	42.81
UNITED STATES	27,943,000	100.00	53,905,000	100.00

Only about one-sixth of the estimated minimum potential water power available in the United States is now being utilized. Of the remaining five-sixths, a certain amount can be economically developed at this time provided various obstacles can be overcome, namely, legal difficulties, scarcity of the necessary capital, materials and labor due to war conditions; and provided a favorable market within reasonable transmission distance can be secured.

A nation-wide survey of developed and undeveloped water powers of the country is being carried on by the Fuel Administration in cooperation with the Geological Survey.

INSPECTION OF ALL POWER-PLANTS

"Maximum production with minimum waste" is the object of a country-wide branch of work of the Fuel Administration, under supervision of the Bureau of Conservation. Every power-plant in the country is inspected and receives a classified rating in accordance with its efficiency shown in conservation of coal. It is believed that this work should become a permanent service of the Government.

From twenty to fifty million tons of coal per year can be saved by correct operation of steam power-plants using their present equipment without the delay or expense involved in the installation of new or improved apparatus, and without curtailment of production.

A conservation engineer, appointed in each State by the Fuel Administration, works under the supervision of the present Federal Fuel Administrator in the State. Responsibility of rating plants falls upon the administrative engineer; the rating to be based upon reports of inspectors who collect definite information.

Conservation of Power and Light

The general plan for the conservation of light and power has been systematized under the following subdivisions:

Economy in utilization of power and light in factories.
Elimination of uneconomical, isolated plants.
Application of skip-stop to railways; regulation of car-heating and lighting.
Utilization of excess water power and inter-connection of power systems.
Limiting production of power to the most efficient plants available.
Economy in the refrigerating and ice manufacturing industry.

Efforts are being directed so as to best serve the interests of all with a minimum of inconvenience and cost and with the object of making the available coal supply go as far as possible.

The work is carried out through cooperation of the following:

FIRST.—Force of engineers with the Fuel Administration at Washington.
SECOND.—Engineering Department of the Geological Survey.
THIRD.—Power Division of the Council of National Defense.
FOURTH.—An engineer attached to office of each State Administrator.
FIFTH.—Public Service Commissions and State regulatory bodies.
SIXTH.—Chambers of Commerce and similar business bodies.
SEVENTH.—Volunteer engineers throughout the country.

Saving Power and Light in Factories

Material saving in coal used for producing power and light in factories has been accomplished. Figures obtained from factories where the plan has been put into effect show a saving in power of from 11 to 34 per cent. by economies in lighting, rearrangement of machines and shafting, elevator service, keeping rooms at an even temperature, wrapping steam-pipes, etc. These were effected without decreasing output and with practically no expenditure of money.

In each factory a power committee is established, selected from among foremen, watchmen and others, based on ability, alertness, and geographical location on property. An executive committee is taken from the power committee and should include a company official as Factory Fuel Administrator, also factory manager, master mechanic, superintendent, electrician, millwright and chief engineer.

The executive committee prepares report blanks for the various departments and provides talks on power economy to be given once a week. Typical illustrations are given of the possible wastes of power, including use of unnecessary lights; use of lamps of too high candlepower; elimination of carbon lamps; elimination of arc lamps and substitution of nitrogen filled lamps; restriction of sunlight due to dirty windows; operation of motors when machinery is idle; excessive sparking, heating or erratic speed of motors; proper alignment of shafting; grouping of machines and staggering of operations so as to maintain as flat a load curve as possible.

By study of the load curve valuable results have been accomplished in Massachusetts. It has been found possible to shut down generating units hitherto in continuous operation to take care of peaks.

Common faults needing attention are: slipping belts, dry bearings, overheated and underheated parts of plant, excessive drafts due to lack of proper protection about doors, windows, elevator and stair areas; reduction of elevator service or application of the skip-stop to elevator service; testing out of power circuits for relationship of capacity to load carried and paralleling power circuits.

Elimination of Uneconomical Plants

Throughout the country there are approximately 30,000 local electric generating plants in factories, office buildings, hotels, apartments, institutions, hospitals, etc. In many of these, electrical equipment forms the principal part of the plant. Many local electric plants can not readily adopt service from a large central station, but there are large numbers that easily connect with large electrical systems at a resulting money, as well as fuel, saving.

Due to varying conditions it cannot be decided by a general rule which of these plants could economically use other sources of electrical supply, and it means that each plant must be considered alone. With this in view the Fuel Administration has sent questionnaires to operators of local electric plants and the facts obtained facilitate proper consideration of each case individually.

Letters from those who have changed to a central station supply show that the new method is entirely satisfactory, and indicate a general fuel saving of from 20 to 60 per cent. Where hydro-electric power is available there seems to be, on the face of it, little excuse for burning fuel in any electric generating plant.

In Chicago the Power and Light Committee induced the Chicago Western and Indiana Railroad to close their pumping plant and substitute electric power. The Sanitary District Power Company was induced to enter into an agreement with the Commonwealth Edison Company. The City of Chicago now uses the sanitary district water power at its largest pumping station. By these three changes an estimated coal saving of 73,550 tons annually will be effected.

Consolidation of power plants at Richmond, Va.; Ludlow, Mass.; Wooster, Ohio; Charleston, West Va.; Kirkwood, Mo., and at Clinton, Indiana, mean a yearly saving of 35,000 tons. In Keokuk, Iowa, the application of water power for power needs has replaced the supply formerly produced by steam in St. Louis, Missouri. The coal saving here is about 110,000 tons each year.

Skip-Stop System Effective

Great economy has been accomplished in the use of fuel by the introduction of the skip-stop system on electric railways. With the old plan of having cars stop on signal at any street corner, there are usually from 12 to 14 stopping points per mile. With the skip-stop system, properly applied, these are reduced to not more than 8 per mile in business districts, 6 per mile in residence districts, or 4 per mile in open country. With the number of stopping points decreased in this way, a saving of from 10% to 15% is ordinarily effected in power and hence in fuel required, while the time per trip of the cars is reduced, without increase in speed.

The plan of the Fuel Administration is to secure the adoption of the system by voluntary cooperation between the railway companies and the various municipal or state authorities and to bring this about through the State Administrators. The skip-stop system has been adopted in Detroit, Baltimore, Brooklyn, Newark, Washington, Cincinnati, Minneapolis, St. Paul, Indianapolis, Columbus, Dayton, Toledo, Oakland, New Haven, Richmond, Memphis, Nashville and many other cities. The Connecticut company has reported a saving in fuel of 10 per cent. for its New Haven lines and reports indicate saving in the other places at rates varying from 3,600 tons per year in Columbus to 21,000 tons per year in Detroit.

Interconnection of Systems and Use of Water Power

A method of conservation which opens up a field with almost limitless possibilities for future development, is interconnection of present power systems, and utilization of excess water power at present available. In many places duplicate transmission systems exist, serving practically the same territory. An interconnection for mutual exchange of energy in many cases results in marked economies.

Often the lines of a power company which derives all, or nearly all, of its energy from water power runs very close to the lines of another company which uses coal for generation of power. Since no company is so fortunate as to be operating with a 100% load factor, there are times, during light load, when the water power company is forced to allow unproductive water to flow over its dam. At such a time a great saving in fuel can be effected if the two companies are tied together and the load on the steam station transferred in part, or entirely, to the water power plant.

Numerous hydro-electric companies have for a long time been carrying out this idea within their own systems, where the bulk of their power is derived from water, and at the same time they maintain a steam reserve to carry their load during low water periods. In some cases these system-interconnections involve a considerable expenditure of time and money. In many instances, however, considerable savings can be effected with little delay or expense.

Duplication of Power Systems

The Fuel Administration has located, so far, about 500 instances where there exists, in one form or another, a duplication of power production and supply. In other words, two or more central stations are furnishing electrical energy with systems paralleling one another. It has often been found, that at little or no expense, paralleling systems can be connected and supplied from the most economical station, or an interchange of power can be effected.

In a town of not more than 1500 inhabitants the municipal plant was closed down and electrical energy obtained from the local utility at a fuel saving of 1,200 tons of coal per year. The same utility plans a similar change in a town a trifle larger, where their service is available that will result in a saving of about 2,000 tons of coal per year. These cases represent those of the smaller class, but assuming them to represent the average of the 500 situations located, it can be seen that the possible fuel saving is about 1,000,000 tons annually.

Further economy in this connection is that of utilizing, wherever possible, all available water power to the very fullest extent and where this is done a maximum fuel saving is obtained.

Economy in the Ice Manufacturing Industry

In cooperation with the Joint Commission on Refrigeration which was organized to assist the Government during the war, the Fuel Administration is introducing numerous proved economies in the operation of ice and refrigerating plants. One plan is that of allotting a definite amount of coal to individual plants, depending upon the size and type of plant, such allowances being based upon a reduction of 10 to 15 per cent. of the average present fuel consumption. This makes it necessary to adopt many simple measures of economy that had been overlooked.

Another conservation method is to produce white, or opaque, ice at a fuel saving of 5 to 20 per cent. This is accomplished by eliminating the power that is usually used for producing a transparent product.

A plan which saves considerable ammonia as well as fuel successfully applied last winter, is that of operating during the winter season only the most efficient plant, or plants, as the particular case requires, in communities where, during the summer, all plants are required. This arrangement provides that the operating plant, or plants, will sell at wholesale rates to those whose plants are temporarily closed.

Saving Fuel in Industrial Furnaces

The Fuel Administration has given special attention to fuel conservation in all plants using fuel for direct heat, such as the clay products industries, through a special section devoted to that work.

This section is in charge of an engineer who has under his immediate supervision 13 districts, comprised of 31 states, covering the territory in which industrial furnaces are used. Each district has a local head who has in his organization an advisory board and a corps of inspecting engineers. The district chiefs estimate the probable annual saving at 3,000,000 tons of coal.

CURTAILMENT OF NON-WAR INDUSTRIES

SOON after the establishment of the Fuel Administration it became evident that the continuation of the war would make it necessary to curtail the amount of fuel being consumed by industries, the operation of which was not directly essential to successful conduct of hostilities. Investigation showed, however, that about twenty billions of dollars were invested and ten million men employed by industries of this class. If they were suddenly curtailed 50 per cent., five million families would lose their means of livelihood and severe hardship, if not widespread panic, would result.

While some employees of non-war industries might find work in munition plants, the larger proportion were not at that time trained or adapted for such service. It was realized that keeping labor employed was necessary to keep the country in healthy condition for the successful waging of war. The program was formulated, therefore, of curtailing these industries gradually.

Curtailment Orders Lifted

Pursuant to the policy announced on November 13th by the United States Fuel Administration, of its intention to remove restrictions on the consumption of fuel as speedily as conditions warranted, orders were issued, effective December 2, 1918, lifting absolutely all restrictions, laid under previous curtailment orders, upon florists, window glass, clay products and cement manufacturers. The orders permitted these four industrial groups to resume their pre-war status, so far as the burning of coal and other fuel is concerned.

On October 29, 1918, an order was issued authorizing each State Fuel Administrator to give country clubs the necessary permits to receive and burn, during the winter, bituminous or steam anthracite coal whenever, in his opinion, there is a surplus of such fuel for this purpose. The authorization further stated that under no condition should any country club be permitted to use domestic sizes of anthracite coal.

Manufacture of Clay Products Restricted

In April, 1918, the Fuel Administration issued regulations, approved by the War Industries Board, restricting manufacture of clay products and rearranging and dividing the manufacturing program in such a way as to place this industry on a war basis. The products dealt with were arranged in classes, and manufacture curtailed as follows: Face Brick, Common Brick, Paving Brick, Terra Cotta, Roofing Tile, Floor and Wall Tile and Sanitary Ware, each 50 per cent. restriction; Hollow Tile and Drain Tile and Sewer Pipe, each 25 per cent.; and, Stoneware (except chemical), 15 per cent.

Clay Products Industries Saved 1,381,000 Tons

Official reports from the clay product industries, covering the first six months of 1918, showed a saving of 1,381,000 tons of coal resulting from the orders issued by the Fuel Administration restricting the amount of fuel to be used by plants in this industrial group. The restrictive orders were made necessary in order that essential war activities might not suffer for an adequate supply of fuel.

When final compilations are made on the basis of complete returns officials are confident that the total saving will approximate not less than one and a half million tons for the half-year period in these industries. Present reports indicate that under the orders curtailing the fuel supply of this industry, which became effective April 13th last, there was effected 37 per cent. reduction in the normal amount of coal consumed.

The figures announced are of particular interest, inasmuch as the curtailment orders were so worded that plants were permitted to burn their allotment of fuel at any time during the year, and many concerns chose to operate at full capacity until their fuel allowance was consumed, and then close down entirely. It is apparent, therefore, that had the war continued, and the necessity for curtailment remained, the figures for the last half of the year would have revealed a very much greater saving.

Fuel to Cement Makers Cut 25 Per Cent.

The Fuel Administration, on August 16, 1918, issued an order curtailing the supply of fuel for the production of cement 25 per cent. The cement industry uses approximately 8,000,000 tons of coal a year, and while a large quantity of cement is used for Government and other necessary construction, a careful study of the cement industry by the Building Section of the War Industries Board and by the Fuel Administration showed that considerable quantities of cement were being manufactured for use in non-war construction, which could be postponed until later.

Manufacture of Malt Liquors Forbidden

After consultation with the Chairman of the War Industries Board it was decided on July 3, 1918, by the Fuel Administration, to restrict by 50 per cent. the consumption of fuel among industries engaged in production of alcoholic or non-alcoholic cereal beverages, for the year beginning July 1, 1918, and pending the exhaustion of materials that they had in process. These industries, also, were given preliminary warning that they might not be able to continue their operations at all after such exhaustion. At that time the Food Administration directed the cessation of further purchases of raw materials for malting.

On September 16, President Wilson issued a proclamation, under authority of the Lever Act, forbidding the use of foodstuffs to produce malt liquors, in the following language:

> “Because of the increasing requirements of war industries for the fuel productive capacity of the country, the strain upon transportation to serve such industries, and the shortage of labor caused by the necessity of increasing the armed forces of the United States, that the use of sugar, glucose, corn, rice, or any other foods, fruits, food materials, and feeds in the production of malt liquors, including near beer, for beverage purposes be prohibited. And by this proclamation I prescribe and give public notice that
>
> “On and after October 1, 1918, no person shall use any sugar, glucose, corn, rice, or any other foods, fruits, food materials, or feeds, except malt now already made, and hops, in the production of malt liquors, including near beer, for beverage purposes, whether or not such malt liquors contain alcohol; and
>
> “On and after December 1, 1918, no person shall use any sugar, glucose, corn, rice, or any other foods, fruits, food materials or feeds, including malt, in the production of malt liquors, including near beer, for beverage purposes, whether or not such malt liquors contain alcohol.”

Less Fuel for Manufacturing Pleasure Automobiles

Fuel Administrator Garfield on June 12, 1918, stated, in regard to the curtailment of fuel for the manufacture of pleasure automobiles, that the general question was in the hands of the Steel Section of the War Industries Board. The Fuel Administrator felt responsible, he said, to limit the amount of fuel used in the manufacture of pleasure automobiles to whatever extent the national situation demanded. He made it plain that even if steel is available for a larger production, he would be compelled to limit the fuel for the manufacture of pleasure automobiles in the season 1918-1919 to not over 25 per cent. of that consumed for this purpose in the season 1917-1918.

No Fuel Allowed to Private Yachts

Restrictions of the use of coal and fuel oil on private pleasure yachts were announced by the Fuel Administration on May 29, 1918, after consultation with the Chairman of the War Industries Board. It was ordered that from June 1, 1918, to May 31, 1919, no coal or fuel should be consumed, burned, used on, or furnished to a private yacht for any purpose whatsoever except for galley fuel. It was provided that the order should not be construed to regulate the use of fuel by any craft in the service of the Government; and any private yacht which on June 1, 1918, was away from its home port was allowed to use fuel to reach its home port, by the shortest practicable route.

Curtailment Observed by Glass Makers

The Fuel Administration, in February, 1918, limited the use of coal in production of common window glass to 50 per cent., saving 500,000 tons of coal per year.

Automatic machine bottle manufacturers agreed with the Fuel Administration in April, 1918, to curtail their output 15 per cent.

Saving Fuel in Making Ice

Representatives of ice and refrigerating industry of the eastern section of the country at a conference on June 6, 1918, agreed to.

plans whereby the Fuel Administration, in co-operation with the Food Administration, might lend active assistance in the adoption of recognized methods of conservation. It was agreed that no measure should be adopted to restrict the ice output.

Fifty Per Cent. Cut for Florists

Following several conferences with florists, it was agreed that a 50 per cent. curtailment in fuel, which, in general, means a curtailment of hot-house space, would permit the florists to preserve their most valued stock and keep their business organization intact during the war. A regulation to this effect was, therefore, issued by the Fuel Administration governing the use of fuel by florists, during the year beginning April 1, 1918, and ending March 31, 1919.

Musical Instrument Curtailment

The Fuel Administration and representatives of the musical-instrument industry reached an agreement in April, 1918, curtailing output 30 per cent. during April, May and June These manufacturers arranged with the War Industries Board for transfer of war work to the musical-instrument factories wherever possible.

Talking-machine manufacturers tentatively agreed to curtailment of 50 per cent. machines and 30 per cent. records.

WOOD AS FUEL AND HOW TO USE IT

Wood can be utilized to best advantage in a dwelling or apartment-house heating-plant, or cook-stove, by burning it in combination with coal. It is advisable to throw wood blocks onto the fire when fire box is comparatively empty and cover them with coal.

Much coal consumption can be saved in this way without interfering with comfort, but it is well to give the fire more frequent attention than when burning coal alone. The check-damper in the smoke-pipe should also be kept open wider than when burning coal alone as less chimney draft is needed. When wood is used alone in a heater intended for coal it is recommended that the grate be partly covered with sheet iron or fire-brick to reduce the draft.

Once the idea of using wood instead of coal takes hold of people in any community as a valuable aid in winning the war, it has been found that help for the movement comes in many ways; usually bettering, rather than depleting the farms. The Department of Agriculture and the Fuel Administration have statistics showing that there is a vast quantity of dead wood in many sections sufficient for domestic purposes in those parts.

The cooperation of State Fuel Administrators was sought and efficiently given.

When the Fuel Administration was first organized the country was facing a coal shortage, and the situation became more serious as time advanced. It was felt that a vigorous and nation-wide campaign for the use of wood for fuel would alleviate the situation to a considerable extent during the winter of 1917, and its full benefits would be reaped during the winter of 1918.

There was much activity in the South for substitution of wood. Governor Brough, of Arkansas, called attention to the practice of burning wood in clearing ground and urged its use as firewood. The Fuel Administration of North Carolina established municipal wood yards. Use of convict camps was adopted in some localities. In practically every county of Tennessee War Fuel Companies were organized with marked success. In some counties there are two companies. The capitalization of each company averaged about $1,500. Each company has a manager who superintends cutting and selling wood.

Hickory, oak, beech, hard maple, birch, cherry, ash, longleaf pine, locust and such species have high fuel value in comparison with other woods. One cord of any of these when seasoned weighs about 4,000 pounds and is the equal in fuel value to about one ton of coal, according to a bulletin on the subject issued by the United States Forest Service. Hickory is the best wood for a coal substitute. The oaks come next and are followed in order by beech, birch and maple.

The Fuel Administration suggested to State Fuel Administrators that in those States where a plentiful supply of wood is available, the sale, shipment and distribution of coal for domestic purposes to persons residing outside of cities or incorporated towns may be prohibited, except under special permit.

Restriction Raised on Petroleum Products for Roads

The Fuel Administration on November 14th cancelled its order of May 13th, 1918, restricting the sale for road purposes of asphalt, road binders, road oil, tar binders and dressings, and announced that shipments of these materials can now be made without special permit and without filing application for road work through local state highway departments or through the United States Highways Council.

The administration also announced that disapprovals previously made were revoked and that pending applications would require no further action.

Arrangements for delivery of road materials may now be made in the same manner as before the issuance of the restrictive order, which was the result of war demands.

RETAIL COAL DEALERS REFUND OVERCHARGES

A sum approximating $16,000 has been refunded by retail coal dealers in Minnesota and South Dakota either to their local customers or, in case these could not be located, to local Red Cross Chapters.

APPEAL TO SAVE GASOLINE ON SUNDAYS

Toward the end of August, 1918, the Fuel Administration found that as a result of increased war demands and increased domestic consumption the stocks of gasoline, particularly on the Atlantic seaboard, had been depleted to such an extent as to require immediate action to prevent their further depletion pending the decrease in demand normally following the coming of the late fall and winter months.

Accordingly, on August 27, 1918, as a war emergency measure, a request was issued to the people of the United States east of the Mississippi River that the use of all motor propelled vehicles, with certain limited exceptions, be discontinued on Sundays until further notice, except where such use was absolutely necessary and where no other means of transportation were available.

The response was instantaneous; the compliance almost unanimous. From every section reports showed cessation of Sunday motoring from 75 to 99 per cent. On September 20 announcement was made by the Fuel Administration that the use of automobiles for promoting the Fourth Liberty Loan campaign was regarded as necessary and entirely within the spirit of the gasolineless Sunday request.

As a further conservation measure the Fuel Administration on September 27 requested that all automobile, motorcycle and motorboat racing and speed contests be suspended for the period of the war. This was calculated not only to save gasoline but to supply expert operators and mechanics for service in the Army Transport and Aeronautic branches of the Army.

So effective was the gasolineless Sunday request that on October 17 the Fuel Administration was able to issue an announcement that the request was withdrawn as of October 20. It was estimated that a saving had been effected of at least one million barrels of gasoline, from which, it was known, more than 500,000 barrels, or ten shiploads, had been shipped overseas.

STATISTICS OF OIL REFINERY PRODUCTS, 1917, 1916

Prepared from records of Bureau of Mines and United States Custom House.
(Stated in Barrels of 42 Gallons.)

U. S. Consumed:	Gasoline and Naphthas	Kerosene and Illuminating	Gas Oil and Fuel Oil	Total Consumption
1916	40,547,861	14,304,935	88,245,068	143,097,864
1917	52,172,811	22,034,101	126,475,942	200,682,854
Increase	11,624,950	7,729,166	38,230,874	57,584,990
Per Cent.	28.6%	54.0%	43.3%	40.2%
Exported:				
1916	8,473,102	20,349,724	22,800,053	51,622,879
1917	10,788,147	15,613,010	26,645,287	53,046,444
Difference	2,315,045	4,736,714	3,845,234	1,423,565
Per Cent.	(Inc.)27.3%	(Dec.) 23.3%	(Inc.) 16.9%	(Inc.) 2.8%
Total Outgo:				
1916	49,020,963	34,654,659	111,045,121	194,720,743
1917	*62,960,958	†37,647,111	‡153,121,229	§253,729,298
Increase	13,939,995	2,992,452	42,076,108	59,008,555
Per Cent.	28.4%	8.6%	37.9%	30.0%

* Production was 64,993,643 barrels, which leaves 2,032,685 barrels in stock.

† Production was 38,143,208 barrels, which leaves 496,097 barrels in stock.

‡ Includes 3,396,692 barrels used from stock, as 1917 production was 149,724,537 barrels.

§ Production was 867,910 barrels less.

PRODUCTION OF GASOLINE FROM NATURAL GAS

The quantity of raw gasoline recovered from natural gas in 1917, was 217,884,104 gallons, a gain of 114,391,415 gallons, or 111 per cent., over the output in 1916, according to statistics compiled in September, 1918, under the supervision of J. D. Northrop, Geological Survey.

Of the 1917 production 168,921,555 gallons, or 77.5 per cent., was recovered by compression and by vacuum pumps and the remaining 49,017,549 gallons, or 22.5 per cent., by absorption and by salvage from gas mains.

The quantity of commercial gasoline represented by the output of raw gasoline in 1917, though not susceptible of accurate determination, probably amounted to more than 300,000,000 gallons, or about 7,143,000 barrels of 42 gallons each.

The volume of natural gas from which the output of natural-gas gasoline in 1917 was recovered is estimated to have amounted to about 429,000,000,000 cubic feet, and the average recovery of gasoline per thousand cubic feet by all methods was about one-half gallon.

The number of plants, including vacuum-pump plants, recovering gasoline from natural gas increased from 596 at the beginning of 1917 to 886 at the end of that year.

GASOLINE FROM NATURAL GAS MARKETED IN UNITED STATES IN 1917

State	Quantity Produced Gallons	Value	No. Operators	No. Plants	Daily Capacity Gallons
Oklahoma	115,123,424	$21,541,905	167	234	492,436
West Virginia	32,668,647	6,511,813	128	188	135,663
California	28,817,604	4,438,022	45	49	99,761
Pennsylvania	13,826,250	2,778,098	287	251	59,164
Texas	6,920,405	1,149,441	10	11	32,550
Ohio	5,439,560	1,051,376	49	61	25,137
Louisiana	4,979,754	814,747	15	20	20,118
Illinois	4,934,009	866,033	33	55	17,392
Kentucky	3,818,209	763,186	5	5	13,400
Kansas	1,174,980	241,219	4	6	4,642
New York-Colorado	181,262	33,116	7	6	2,122
	217,884,104	$40,188,956	750	886	902,385

VALUE OF NATURAL GAS PRODUCED

In the twelve leading States in this production by periodical years from 1890 to 1916. In order of present rank. Figures from U. S. Geological Survey.

	1916	1915	1910	1905	1900	1890
West Va.	$47,603,396	$36,424,263	$23,816,553	$10,075,804	$2,959,032	$5,400
Penna.	24,344,324	21,139,605	21,057,211	19,197,336	10,215,412	9,551,025
Ohio	15,601,144	17,391,060	8,626,954	5,721,462	2,178,234	4,684,300
Okla.	11,983,774	9,195,804	3,490,704	130,137	....	....
California	5,440,277	4,069,004	476,697	133,696	79,083	33,000
Kansas	4,855,389	4,037,011	7,755,367	2,261,836	356,900	12,000
Texas	3,143,871	2,593,873	*956,683	*15,909	*20,000	....
Louisiana	2,660,445	2,163,934	....	....	....	....
New York	2,524,115	2,335,252	1,678,720	623,251	335,367	552,000
Kentucky	752,635	614,998	456,293	237,290	†286,243	†30,000
Indiana	503,373	695,380	1,473,403	3,094,134	7,254,539	2,302,500
Illinois	396,357	350,371	613,642	7,233	1,700	6,000

* Includes Alabama and Louisiana.

† Includes Tennessee.

NOTE: Pennsylvania produced $19,282,375 in 1888. Its production decreased gradually until 1896, and then increased again.

PETROLEUM IN FIRST HALF OF 1918, AND 1917

Crude petroleum marketed, apparently consumed, and stocks on hand in the United States, by fields. Tabulated from figures compiled by J. D. Northrop, U. S. Geological Survey. Figures are for barrels of 42 gals.

Field	Stocks January 1	Marketed First 6 Mos. of year	Apparently consumed same 6 mos.	Stocks July 1
		1918		
Mid-continent	99.467,214	83,385,460	85,622,404	97,230,270
California	32,553,730	49,811,802	54,643,902	27,721,630
Appalachian	3,821,416	12,397,660	12,669,181	3,549,895
Gulf	8,384,814	10,926.920	11,043,414	8,268,320
Illinois	3,560,222	6,764,240	7,405,792	2,918,670
Rocky Mountain	515.341	5,774,060	5,388,721	900,680
Lima-Indiana	1,906,241	1,577,290	2,028,761	1,454,770
	150,208,978	170,637,432	178,802,175	142,044,235
		1917		
Mid-continent	104,256,239	76,074,485	73,843,948	106,486,776
California	43,837,242	45,612,252	52,683,989	36,765,505
Appalachian	3,877,508	12,114,179	11,619,674	4,372,013
Gulf	9,380,767	11,980,826	11,395,141	9,966.452
Illinois	6,397,822	8,134,010	9,941,278	4,590,554
Rocky Mountain	791,071	4,350,153	4,310,499	830,725
Lima-Indiana	2,140,865	1,891,184	1,864,891	2,167,158
	170,681,514	160,157,089	165,659,420	165,179,183

FUEL OIL USED BY RAILROADS IN 1917

Statistics compiled under the supervision of J. D. Northrop, of the Geological Survey, show that the quantity of fuel oil consumed by oil-burning locomotives in 1917 was 45,707,082 barrels, a gain of 3,580,665 barrels, or 8.5 per cent. over 1916 and a larger consumption than in any other year.

The total distance covered by oil-burning engines in 1917 was 146,997,144 miles, and the average distance covered per barrel of fuel consumed was 3.2 miles. Oil-burning locomotives were operated in 1917 over 32,431 miles of track in 21 States.

WORLD'S PRODUCTION OF PETROLEUM

Crude petroleum in 1917, and since 1857, by Countries. Prepared by J. D. Northrop, Geological Survey.

Country	Production, 1917 Barrels 42 Gals.	Production, 1917 Metric Tons	Production, 1917 Per Cent. Total	Total Production 1857-1917 Barrels 42 Gals.	Total Production 1857-1917 Per Cent. Total
United States	*335,315,601	44,708,747	66.98	4,252,644,003	60.89
Russia	†69,000,000	9,418,509	13.78	1,832,583,017	26.24
Mexico	55,292,770	8,264,266	11.04	222,082,472	3.18
Dutch East Indies	‡12,928,955	1,778,495	2.58	175,103,267	2.51
India	§8,500,000	1,133,333	1.70	98,583,522	2.41
Galicia	5,965,447	‖829,629	1.19	148,459,653	2.13
Japan and Formosa	2,898,654	386,487	.58	36,065,454	.52
Rumania	2,681,870	†373,000	.54	142,992,465	2.05
Peru	2,533,417	337,789	.51	21,878,285	.31
Trinidad	1,599,455	222,456	.32	5,418,885	.08
Argentina	1,144,737	168,340	.23	3,047,858	.04
Egypt	1,008,750	134,500	.20	2,768,686	.04
Germany	995,764	†140,000	.20	5,952,861	2.30
Canada	205,332	27,378	.04	24,112,529	3.50
Italy	50,334	†7,000	.11	947,289	.01
Other Countries	†¶530,000	70,667	.11	927,000	.01
	500,651,086	68,000,596	100.00	6,983,567,246	100.00

* Quantity marketed.
† Estimated.
‡ Includes British Borneo.
§ Estimated in part.
‖ Includes 19,167 barrels produced in Cuba.

BIG OVERSEAS DEMAND FOR GASOLINE

The overseas demand for motor transport grade of gasoline has increased rather than diminished since the signing of the armistice, it was announced on November 25th by the Fuel Administration.

The motor transport grade and the two aviation qualities are the chief items in the overseas demands upon American sources of supply. Aviation demands have greatly decreased.

These factors, as well as domestic requirements, will have a considerable bearing on any decision as to whether it is desirable to fix a standard of quality for domestic motor gasoline. The question of a domestic standard has been under consideration for some time.

The Fuel Administration has in hand the results of a very exhaustive investigation of gasoline, which was made in considering the existing specifications for aviation grades. The fixing of a domestic motor standard involves much more than the arbitrary determination of specifications, depending upon the question of ability to supply and the consideration of price of all petroleum products, which are directly affected by any alteration of gasoline grades.

PETROLEUM MARKETED IN 1917 AND 1916

Comparative figures for the United States, tabulated from statistics compiled under supervision of J. D. Northrop, U. S. Geological Survey. By States and Fields in order of rank in 1917, of value produced, in barrels of 42 gallons.

State	1917 Value	1917 Quantity barrels	1917 Average price barrel	1916 Value	1916 Quantity barrels
Oklahoma	$181,646,981	107,507,471	$1.690	$128,463,805	107,071,715
California	86,161,764	93,877,549	.918	53,702,733	90,951,936
Kansas	67,120,573	36,536,125	1.837	10,339,958	8,738,077
Texas—Total	42,891,555	32,413,287	1.323	25,760.335	27,644,605
" Coastal	22,938,890	21,512,641	1.066	13,925.362	18,341,600
" Northern	19,952,665	10,900,646	1.830	11,834,973	9,303,005
Illinois	31,358.069	15,776,860	1.988	29,237,168	17,714,235
West Virginia	27,246,960	8,379,285	3.252	21,914,080	8,731,184
Pennsylvania	25,154,290	7,733,200	3.253	19,149,855	7,592,394
Ohio—Total	21,104.483	7,750,540	2.723	16,154,940	7,744,511
" Southeastern	15,472,705	4,839,679	3.197	11,245,236	4,608,544
" Lima	5,631,778	2,910,861	1.935	4,909,704	3,135,967
Louisiana—Total	17,224,602	11,392,201	1.600	14,669,774	15,248,138
" Northern	14,075,905	8,561,963	1.644	12,178,262	11,821,642
" Coastal	3,148,697	2,830,238	1.113	2,491,512	3,426,496
Wyoming	11,047,876	8,978,680	1.230	5,644,080	6,234,137
Kentucky	7,033,714	3,088,160	2.278	2,188,495	1,202,569
New York	2,850,378	879.685	3.240	2,190,195	874,087
Indiana	1,470,548	759.432	1.936	1,207,565	769,036
Montana	146,272	99,399	1.472	44,019	44,917
Colorado	128,100	121,231	1.057	217,139	197,235
Tennessee	28,448	12,196	2.333	1,317	677
Others	*20,600	10,300	2.000	†14,410	7,705
Totals	$522,635,213	335,315,601	$1.559	$330,899,868	300,767,158
Field					
Mid-continent	$282,796,124	163,506,205	$1.730	$162,816,998	136,934,439
California	86,161,764	93,877,549	.918	53,702,733	90,951,936
Appalachian	77,786,495	24,932,205	3.120	56,689,178	23,009,455
Illinois	31,358,069	15,776,860	1.988	29,237,168	17,714,235
Gulf	26,087,587	24,342,879	1.071	16,416,874	21,768,096
Rocky Mountain	11,322,248	9,199,310	1.231	5,905,238	6,476,289
Lima-Indiana	7,102,326	3,670,293	1.935	6,117,269	3,905,005
Others	*20,600	10,300	2.000	†14,410	7,705
Totals	$522,635,213	335,315,601	$1.559	$330,899,868	300,767,158

* Includes Alaska, Michigan and Missouri. † Includes Alaska and Michigan.

FEDERAL FUEL ADMINISTRATORS

Alabama	S. P. Kennedy		Anniston
*Arizona	Charles M. Shannon		Phoenix
Arkansas	H. C. Couch		Pine Bluff
California	Albert E. Schwabacher	First Nat.. Bank Bldg.	San Francisco
California (Oil)	D. M. Folsom	Amer. Natl. Bank Bldg.	San Francisco
Colorado	William J. Galligan	State Museum Bldg.	Denver
Connecticut	Thomas W. Russell	State Capitol	Hartford
Delaware	Charles H. Ten Weeges	145 Dupont Bldg.	Wilmington
*Dist. of Columbia	Frank G. Jones (Director)	U. S. Fuel Adm'n	Washington
Florida	Arthur T. Williams	7 West Forsyth Street	Jacksonville
Georgia	Dr. L. G. Hardman		Commerce
*Idaho	C. C. Anderson		Boise
*Illinois	Raymond E. Durham	Kimball Bldg.	Chicago
Indiana	Evans Woollen	227 Federal Bldg.	Indianapolis
Iowa	Charles Webster	State House	Des Moines
Kansas	Emerson Carey		Hutchinson
Kentucky	Wiley B. Bryan	Inter-Southern Bldg.	Louisville
Louisiana	John G. O'Kelley	Canal Bank Annex	New Orleans
Maine	J. C. Hamlen	Masonic Bldg.	Portland
Maryland	Ferdinand A. Meyer	16 Commerce Street	Baltimore
Massachusetts	James J. Storrow	State House	Boston
Michigan	William K. Prudden	Book Bldg.	Detroit
Minnesota	John F. McGee	New York Life Bldg.	Minneapolis
*Mississippi	W. A. Scott		Jackson
Missouri	Wallace Crossley	State Capitol	Jefferson City
*Montana	Martin H. Gerry, Jr.		Helena
Nebraska	John L. Kennedy	Saunders-Kennedy Bldg.	Omaha
Nevada	E. H. Walker	State Capitol	Carson City
New England	James J. Storrow	State House	Boston
*New Hampshire	Hovey E. Slayton		Manchester
New Jersey	Richard C. Jenkinson	Ordway Bldg.	Newark
*New Mexico	John W. Poe		Albuquerque
*New York	D. W. Cooke	151 5th Ave.	New York City
*North Carolina	R. C. Norfleet		Winston-Salem
North Dakota	I. P. Baker		Bismarck
*Ohio	Joseph H. Frantz	Wyandotte Bldg.	Columbus
Oklahoma	P. A. Norris		Ada
Oregon	Fred J. Holmes	Northwestern Bank Bldg.	Portland
Pennsylvania	William Potter	Schubert Bldg.	Philadelphia
Pittsburgh District	D. W. Kuhn	Chamber of Commerce	Pittsburgh
*Rhode Island	Malcolm G. Chase		Providence
*South Carolina	B. E. Geer		Greenville
South Dakota	W. G. Bickelhaupt		Aberdeen
Tennessee	W. E. Myer	State Capitol	Nashville
Texas	Wiley Blair	Pacific and Hawkins Streets	Dallas
Utah	W. W. Armstrong	Box No. 1788	Salt Lake City
Vermont	H. J. M. Jones		Montpelier
*Virginia	R. H. Angell		Richmond
*Washington	Winlock W. Miller		Seattle
West Virginia	J. Walter Barnes		Fairmont
Wisconsin	W. N. Fitzgerald	1st Natl. Bank Bldg.	Milwaukee
Wyoming	Augustine Kendall	P. O. Box 942	Rock Springs
Cuba	Albert G. Smith	Care Ward Line	New York City

* Indicates there was another Administrator, succeeded by present incumbent. They were: Arizona, Will L. Clark; District of Columbia, John L. Weaver; Idaho, F. R. Gooding; Illinois, John E. Williams; Mississippi, C. L. Townes; Montana, W. J. Swindlehurst; New Hampshire, C. M. Floyd; New Mexico, W. C. McDonald; New York, A. H. Wiggin; North Carolina, A. W. McAlister; Ohio, Homer H. Johnson; Rhode Island, George H. Holmes; South Carolina, B. B. Gossett; Virginia, Harry F. Byrd; Washington, David Whitcomb.

THE FUEL ADMINISTRATION IN THE COMMUNITY

ESSENTIAL in increasing the production and controlling the distribution and use of fuel, are the services performed by the community organizations and field forces of the Fuel Administration. All the state, district and field branches of the fuel organization, work under supervision of the Fuel Administrator, the details of whose work are delegated to the heads of the Administrative, Distribution and Oil Divisions.

The Assistant Fuel Administrator, who is the chief executive in the absence of Mr. Garfield, is also the General Director of the Administrative Division, by which all functions of the organization are exercised, except distribution, and matters pertaining to oil. In this division are the Bureau of State Organizations, Legal Bureau, Bureau of Production, Bureau of Prices, Bureau of Conservation, Bureau of Traffic and Transportation, Bureau of Education, Bureau of Investigation, Bureau for District of Columbia, Mine Track Bureau and Business Office.

The General Director of Distribution has charge of the distribution of bituminous and anthracite coal and of coke through those bureaus. He is in charge of the Bureau of Statistics, Bureau of State Distribution and Bureau of Gas Plants.

The General Director of the Oil Division has charge of all activities which have to do with petroleum and its products and also natural gas. Included in these activities are: stimulation of production of crude petroleum; equitable distribution of its refined products; improvement of transportation facilities; provision for ample supply of such products for the Army, the Navy, the Shipping Board, all war industries and the needs of the Allies; consideration of prices to the end that fair prices may be maintained; prevention of unfair and improper trade practices, and the exercise of general supervision over the oil industry, observing, however, the principle that as far as possible the industry shall govern itself.

State Fuel Administrators

The State Fuel Administrator with his state and local organizations, is the basic unit of the fuel distributing system. It is the State Fuel Administrator who must make a comprehensive survey of the requirements for fuel in his state and must submit to Washington an annual "budget" showing the fuel needed. It is his business to work with the national administration until this budget has been brought into line with possibilities of production and transportation.

It is his duty to keep in touch with all the essential demands for fuel within his state and to see that the amount allotted to it is divided equitably and in accordance with the primary necessities of the war industries and domestic consumers. In fact, he is the channel through which the necessities of the state are represented at Washington and the rules, regulations and restrictions necessary from a national standpoint are administered in his state. His powers and responsibilities are very large. He must maintain the broad national viewpoint while keeping in intimate touch and sympathy with the individual problems of the citizens of his state.

When necessary, the State Administrator issues emergency requests and he specifies what supply, if any, shall be cut off or curtailed in order to fill these emergency requests. He is empowered to make diversions.

He aids in increasing production by encouraging prompt unloading and return of cars. He is granted discretionary power as to local application of the policy regarding preferences affecting industries within his state, and in exercising this authority works in conjunction with the Bureau of State Distribution. The War Industries Board decides what consumers shall have preference in securing coal, but the Fuel Administration, through this bureau, assists in the compilation of complete preference lists, by obtaining reports and recommendations on individual firms from State Administrators.

Each community has a Fuel Committee headed by a chairman bearing the title of County Fuel Administrator or Local Fuel Administrator. These committees work under supervision of State Administrators. An important function of the local organization is the fixing of retail prices in the community, subject to the approval of the State Administrator.

Conservation Engineers in the Field

Three groups of engineers comprise the field force of the Industrial Fuel Section of the Bureau of Conservation of the Fuel Administration. The chief effort in the conservation work is to effect saving of fuel without unnecessary curtailment of industry, and without interfering with the comfort of domestic consumers.

The Fuel Engineering group specializes in a careful analysis of the methods of using fuel in each one of the 250,000 steam power plants of the country. The operators of each plant where coal is used are urged to adopt economical methods. With the improvements recommended in equipment and firing practice, it is estimated that from fifteen to twenty million tons of coal per year will be saved.

The Power and Light group of engineers effects economical use of power in industrial plants after such power has been created. It brings about re-adjustment of heavy power loads of public utilities, persuades small wasteful plants to obtain power from large producing stations; encourages introduction of skip-stops on electric railways; inaugurates interconnection of public utilities and the elimination of unnecessary duplication among such plants; urges full utilization of available water power; and points out many other ways of saving fuel, including discontinuance, during the war, of the use of old-fashioned carbon filament electric lamps.

The Industrial Furnace group covers fuel conservation in all industrial plants using fuel directly in the manufacture of their products, and not through steam generating; such as the clay product industry.

As the railroads consume about 25 per cent. of the fuel output, the cooperation of the Railroad Administration has been obtained in the saving of fuel consumed in locomotives, round houses and railroad machine shops. A comprehensive bureau has in hand a coal conservation campaign for the Railroad Administration, which works in cooperation with the Fuel Administration, through an official giving special attention to this work.

Wide Powers of District Representatives

District Representatives take complete charge of coal shipments for the Fuel Administration and see to it that the output of all mines is distributed in accordance with the Federal Regulations. They have full authority to prevent any violations. The country is divided for administrative purposes into twenty-eight coal producing districts. There is a District Representative in each with assistants and inspectors who work under supervision of the Distribution Division.

This force takes charge of enforcement of the zone system of distribution inaugurated by the Fuel Administration on April 1, 1918, under which production has been greatly increased through the elimination of much train haulage which was formerly performed.

Besides the District Representatives there are 78 Administration inspectors and 106 state inspectors working constantly at the mines to see that regulations are obeyed and that only coal which has been properly cleaned shall be shipped.

District Representatives give advice on means of increasing production. They attend to the proper routing of shipments, and advise Washington and the railroad authorities concerning the best use of cars. They attend to the placing of emergency orders and requests with shippers. With similar duties there are Coke Representatives for the coke regions; also an Anthracite Committee and a Charcoal Representative in Pennsylvania. A chief coke inspector has charge of a force in the coke regions which works for increased output, improvement of quality and conservation of coke at the ovens.

Production Work in the Field

Twenty-eight Production Managers and numerous assistants are conducting an intensive campaign to increase the output of coal, per man, per day. They work under supervision of the Bureau of Production.

In each mine is a production committee of six, three chosen by the workers and three by the operator, which checks up all shortages, causes thereof and applies or recommends remedies.

Prominent speakers and numerous soldiers returned from France have been induced to tour the mining fields and urge upon the miners and operators the vital importance of bringing the production of coal up to the highest point possible.

Oil Work Outside of Washington

Much important work of the Oil Division is performed away from the Washington headquarters. The Directors of the Bureaus of Production and of Oil Well Supplies supervise the work of their bureaus from New York City.

There is a Federal Oil Director for the Pacific Coast, with headquarters in San Francisco, whose authority and discretion in oil matters are similar to those of State Administrators of the Fuel Administration over other fuels.

The Bureau of Oil Conservation has charge of the stoppage of the great waste of crude oil and natural gas in the producing fields. An educational campaign is being waged among users of gasoline, kerosene and lubricants on the necessity of stopping waste.

PERSONNEL OF FUEL ADMINISTRATION

United States Fuel Administrator, Harry A. Garfield
Assistant Fuel Administrator, Cyrus Garnsey, Jr.

Legal Advisor, B. W. Warren
Labor Advisor, John P. White
Technical Advisor, S. A. Taylor

Bituminous Advisor, Rembrandt Peale
Anthracite Advisor, James B. Neale
Transportation Advisor, G. N. Snider

Engineers to Fuel Administration, R. V. Norris and James H. Allport

Executive Secretary to the Fuel Administrator, David Whitcomb

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General Solicitor, W. T. Alden
Licenses and Enforcements,
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Bureau of Production
Director, James B. Neale

Bureau of Labor
John P. White
Rembrandt Peale
Warren Pippin

Bureau of Prices
Director, E. Q. Trowbridge

Bureau of State Organizations
Director, Walter E. Hope (now absent)
Acting Director, Evans Woollen

Bureau of Education
Director, C. E. Persons
Assistant Director, T. A. Cannell

Chief, Advertising Section,
Frank H. Birch

Chief, Copy Section,
Bramwell Davis

Bureau of Conservation
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Chief, States Conservation, A. S. Cobb
Field Assistant, L. R. Clapp
Engineers:
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F. A. Forgee
A. C. Bishop
Osborn Monnett
T. C. Mahady
J. E. Arthur
Robert Treat
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Bureau of Traffic and Transportation
Manager Inland Traffic, representing
Director-General of Railways,
F. M. Whitaker
G. N. Snider

Bureau for District of Columbia
Director, Frank G. Jones

Bureau of Investigation
Director, George F. Macgregor

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Assistant Director, S. L. Yerkes
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Manager, Railroad Fuel Distribution,
W. A. Marsh
Manager, Tidewater Distribution,
H. A. Cochran
Manager, Zone Permits, C. B. Nichols
Manager, Inspection, Chas. M. Means

Bureau of Statistics
Director, C. E. Lesher

Bureau of Anthracite
Director, A. S. Learoyd

Bureau of Coke
Director, W. S. Blauvelt

Bureau of Gas Plants
Director, James T. Lynn

Bureau of State Distribution
Director, A. M. Ogle

(Continued on next page)

(Fuel Administration Personnel, continued from Page 58)

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Counsel and Director of Marine Transportation Bureau, Norman B. Beecher

Bureau of Oil Production
Director, Thomas A. O'Donnell

Bureau of Pipe Lines
Director, S. A. Guiberson, Jr.

Bureau of Traffic and Transportation
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Bureau of Oil Wells Supplies
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Bureau of Technology
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Bureau of Engineering
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Bureau of Domestic Consumption
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Bureau of Prices and Licenses
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Bureau of Oil Conservation
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Bureau of Statistics
Director, Frank J. Silsbee

Bureau of Natural Gas
Director, Thomas B. Gregory

Bureau of Special Assignments
Director, J. W. Williams

Bureau of Lubricants and Foreign Requirements
Director, A. C. Woodman

DISTRICT REPRESENTATIVES AND THEIR DISTRICTS

No.	Name	Address	Fields
1.	J. P. Cameron	Altoona, Pa	Central Pennsylvania.
2.	F. B. Reimann	Butler, Pa.	W. Pa. north of Pitts.
3.	R. W. Gardiner	Pittsburgh, Pa.	Pittsburgh, Panhandle.
3A.	J. B. Huff	Greensburg, Pa.	Westmoreland-Irwin, etc.
3B.	W. L. Byers	Uniontown, Pa.	Connellsville Region.
4.	John C. Brydon	Cumberland, Md.	Somerset Meyersdale, &c.
5.	R. B. Isner	Elkins, W. Va.	Fairmount-Clarksburg
6.	D. F. Hurd	Cleveland, Ohio.	Eastern & Central Ohio.
6B.	W. I. Foss	Bay City, Mich.	Michigan.
7.	W. D. McKinney	Columbus, Ohio.	Southern Ohio.
8A.	C. M. Roehrig	Ashland, Ky.	Big Sandy and Elkhorn.
8B.	R. A. Hord	Lexington, Ky.	Hazard.
9.	A. H. Land	Huntington, W. Va.	Southern W. Va.
10A.	W. R. J. Zimmerman	Charleston, W. Va.	New River; Winding Gulf.
10B.	E. J. Howe	Bluefield, W. Va.	Tug River; Pocahontas, &c.
11.	G. D. Kilgore	Norton, Va.	Clinch Valley, S. W. Va.
12.	E. R. Clayton	Knoxville, Tenn.	Harlan Field; Tenn., Ga.
13.	E. A. Holmes	Birmingham, Ala.	Alabama.
14.	C. E. Reed	Louisville, Ky.	Western Kentucky.
15.	C. G. Hall	Terre Haute, Ind.	Indiana.
16.	F. C. Honnold	Fischer Bldg., Chicago.	Illinois.
17.	H. N. Taylor	Kansas City, Mo.	Ia., Mo., Ks., Ark., Okl., Tex.
18.	W. H. Groverman	Minneapolis, Minn.	Lake Docks.
19.	W. B. Innes	Billings, Mont.	Mont. and No. Wyoming.
20.	Moroni Heiner	Salt Lake City, Utah.	Utah and So. Wyoming.
21.	George D. Kimball	Denver, Colorado.	Colorado.
22.	J. Van Houten	Albuquerque.	New Mexico
23.	D. C. Botting	Seattle, Wash.	Washington.

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INDEX

Subject *Page*
Administrators, State Fuel............ 54
Agreements to wages................ 17
Air easier to heat if moist............ 38
Allotments, anthracite 10
Ammonia, saving in use of........... 44
Analysis of coal production........... 29
Anthracite, allotments 10
Anthracite Committee 59
Anthracite, economy in use of.......35, 36
Anthracite not for factories........... 11
Anthracite production records......... 29
Anthracite shipments 11
Anthracite transported 10
Apportionment of anthracite 10
Assessment of penalties.............. 29
Australia, total coal reserves.......... 26
Austria and Hungary, coal reserves.... 26
Austria-Hungary, coal produced in..... 27
Authority of Fuel Administration...... 6
Automobiles, curtailment 47

Beehive coke statistics.............13, 28
Beer making forbidden............46, 47
Belgium, coal produced in............ 27
Belgium, total coal reserves........... 26
Berlin, rations of coal in............. 21
Best coal for bunkering ships......... 12
Bituminous coal, how to use........30, 31
Bituminous coal used in 1917........8, 9
Bituminous costs examined...........6, 7
Bituminous exports, 1917............8, 9
Bituminous production, 1915-1918..... 9
Bituminous production increase........ 29
Bituminous requirements 8, 9
Bituminous zone system.............. 19
Breckenridge. L. P., on heat control... 30
Brick, manufacture of, restricted....45, 46
Buckwheat and egg coal...........35, 36
Bunker coal, regulation of............ 12
Bunker coal used in 1917...........8, 9
By-product coke statistics..........13, 28

Canada, coal produced in............. 27
Canada, total coal reserves............ 26
"Carbocoal" 25
Care of grates important............. 31
Cement, manufacture curtailed........ 46
Check-draft damper, its importance..30, 32
Chimney gets most of the heat......... 30
China, total coal reserves............. 26
Classifications of coal................ 26
Clay products industry savings........ 46
Clay products, manufacture curtailed.45, 46
Clean coal order..................... 19
Clocks moved forward to save coal...... 24
Cleaning of heating surfaces........30, 34
Clearing woodlands to save coal.....48, 49
Coal production, analysis of.......... 29

Subject *Page*
Coal reserves of the world............ 26
Coke, beehive, coal used for, 1917.....8, 9
Coke Representatives 59
Coke statistics 13, 28
Coke, two kinds, described........... 12
Coking method of firing...........30, 31
Commission, Federal Trade, report of... 6
Comparisons of coal production........ 29
Congestion of industries.............. 18
Conservation, clay products........... 46
Conservation of coal abroad........... 20
Conservation in power-plants.....41 to 45
Conserving light and power......41 to 45
Consumption, bituminous, 1917.......8, 9
Control of heat by dampers.......30 to 36
Control of fuel in Europe............. 20
Cooler houses healthful............... 38
Costs, bituminous, examined..........6, 7
Creation of Fuel Administration....... 6
Crude petroleum in U. S., 1918, 1917.. 52
Crude petroleum statistics, world...... 52
Curtailment, non-war industries....... 45
Curtailment order of Jan. 17, 1918.... 22

Damage to mines in France........... 21
Damper control ....30 to 36
Daylight saving, here and abroad...... 24
Decades, coal production by.......... 29
Deposits of coal in United States....... 27
Development of hydroelectric power.... 40
Distribution of coal in 1912.......... 39
District Representatives 59
District Representatives, powers....... 57
Draft control, importance of......30 to 36
Dry air, harder to heat than moist..... 38
Duplicate transmission systems........ 44
Duplication of power systems......... 44

Efficient power plants, use of......... 44
Egg and buckwheat coal...........35, 36
Electric light, how to save............ 38
Electric lighting restricted............ 24
Electric plants, isolated.............. 42
Electric railways, power used by....... 39
Electricity as a motive power.......... 40
Employees in mines, 1917............ 11
Employees of mines in each state...... 28
Engineers, conservation 56
England, control of coal in........... 20
Europe, control of coal in............ 20
Europe's use of wood as fuel.......48, 49
European countries, production of..... 27
Executives of Fuel Administration...58, 59
Exports of oil refineries.............. 50

Factories, rearrangement in........41, 42
Federal State Administrators.......... 54
Federal Trade Commission, report...... 6
Field work of fuel control........55 to 58

Subject *Page*
Fires, household, how to control...30 to 36
Fixing of wholesale prices............ 7
Florists agree to curtailments......... 48
Foreign demand for gasoline.......... 53
France, coal conditions in............ 20
France, coal produced in............. 27
France, total coal reserves............ 26
Freight rates affect prices............ 17
French mines, damaged.............3, 21
Fuel Administration, creation of....... 6
Fuel Administration Executives.....58, 59
Fuel Administrators for states......... 54
Fuel control throughout country...55 to 58
Fuel oil, advantages of............... 5
Fuel values of various woods.......48, 49
Furnace-heaters, how to run.......... 34
Furnaces, industrial 44

Gas and oil-power development........ 39
Gas, artificial, how to save.......36 to 38
Gas, natural, how to save............ 39
Gases, coal, how to consume them.30 to 36
Gasoline from natural gas............ 51
Gasoline, foreign demand for.......... 53
"Gasolineless Sundays" 50
Germany, coal produced in........... 27
Germany, control of coal in........... 21
Germany, total coal reserves........... 26
Glass, manufacture of, curtailed....... 47
Grades of coal classified.............. 26
Grates, care in shaking..........31 to 34
Grates, how to care for............... 31
Great Britain, coal produced in........ 27
Great Britain, coal reserves.......... 26
Great Britain, control of coal in....... 20
Greenhouses, fuel for, curtailed....... 48

Hauling saved by zone system......... 19
Heat goes up the chimney............ 30
"Heatless Days" order............... 22
Hickory as a coal substitute........48, 49
Hot-water heaters, how to run......... 34
Household heaters, how to run....30 to 36
How to use wood as a fuel.........48, 49
Hydroelectric power development...... 40

Ice conservation methods............ 44
Ice, fuel saved in making of.......... 47
Illumination restricted 24
Imports of soft coal.................8, 9
India, total coal reserves............. 26
Industrial furnaces 44
Industries, coal used by.............. 39
Industries, congestion of............. 18
Industries, power used by............ 39
Industries, soft coal used by, 1917....8, 9
Inspection of all power-plants......... 41
Interconnection of power systems...... 43
Interior Department to do fuel work... 5
Isolated electric plants.............. 42

Subject *Page*
January shut-down order............. 22
Japan, coal produced in.............. 27
Jobbers, licensed and regulated........ 23

Kitchen ranges, how to run......32 to 34

Labor, patriotic response of.........4, 16
Larson, G. L., on heat loss........... 30
Lens coal mines wrecked............. 21
Licenses for coal jobbers............. 23
Light and power saving.........41 to 45
Lightless nights orders.............. 24
Locomotives, oil used by............. 52
Saving coal in households........30 to 38

Manufacturing curtailed 45
Manufactures, power used by......... 39
Margin allowed to retailers........... 8
Maximum production, minimum waste... 41
Mine employees, 1917................ 11
Mine employees, number in each state.. 28
Miners, number in Great Britain....... 20
Miners, exempt from war in England... 20
Mines, soft coal used by, 1917........8, 9
Minimum waste, maximum production.. 41
Mining efficiency stimulated.....14, 15, 16
Moist air, easier to heat than dry...... 38
Moist air, better for health........... 38
Mondays, "Heatless" 22
Motor gasoline, demand for........... 53
Motoring on Sundays suspended....... 50
Musical instruments curtailed......... 48

Natural gas production.............. 51

Officials of Fuel Administration.....58, 59
Oil and gas-power development........ 39
Oil as fuel, importance of............ 5
Oil problem one of transportation...... 5
Oil refinery production and outgo...... 50
Oil refinery exports.................. 50
Oil statistics, 1917, 1916............. 53
Oil statistics, U. S., 1918, 1917........ 52
Oil statistics, world, 1917............ 52
Oil used by locomotives.............. 52
Order to insure cleaning of coal....... 19
Overheated air unhealthful........... 38

Penalties assessed 29
Penalties enforce wage agreement...... 17
Periods, coal production by........... 29
Personnel of Fuel Administration... 58, 59
Petroleum, 1917, 1916............... 53
Petroleum restriction raised........... 49
Petroleum statistics, U. S., 1918, 1917.. 52
Petroleum statistics, world, 1917...... 52
Plants, power, inspection of.......... 41
Population congested in northeast...... 25
Potential water power of U. S......... 40
Power and light saving..........41 to 45
Power and light saving in factories..41, 42
Power, hydroelectric, development...... 40

Subject *Page*
Power of Fuel Administration......... 6
Power-plants, inspection of........... 41
Power systems, interconnection of...... 43
Power systems, duplication of......... 44
Power saved by skip-stop plan......... 43
Power used in United States.......... 39
President's proclamation 14, 15
Price panic prevented................ 8
Prices, wholesale, how fixed.......... 7
Prices, retail, how fixed.............. 8
Primary power development.......... 39
Proclamation of President.........14, 15
Profits of retailers fixed.............. 8
Products of oil refineries............. 50
Production of coal in 1912........... 39
Production, bituminous, 1915-1918.... 9
Production, coal, in the world......... 27
Production, coal in U. S., 1917-1916... 28
Production, coal analysis of........... 29
Production, efforts to increase...14, 15, 16
Production, increase in...........3, 4, 9
Proper damper control..........30 to 36
Public utilities, coal used by.........8, 9
Public utilities, power used by......... 39

Radiators, how to take care of......33, 34
Rail haul saved by zone system........ 19
Railroads, coal used by, 1917 ....8, 9
Railroads, fuel oil used by............ 52
Ranges, kitchen, how to run......32 to 34
Rank of states in coal production...... 28
Rating of power-plants..........41 to 45
Rations of coal in Europe..........20, 21
Refinery, oil, production and outgo..... 50
Refrigerating plants, saving in........ 44
Refund by coke company............. 21
Report on coal situation, 1917......... 6
Representatives, District 59
Reserves, coal of the world........... 26
Resources, coal, of the U. S........... 27
Restriction of manufactures........... 45
Restriction order of Jan. 17, 1918..... 22
Retail prices, how fixed.............. 8
Road-making materials 49
Rules, general, on running heaters..32, 33
Russia and Siberia, coal reserves...... 26
Russia, coal produced in............. 27

Saving by skip-stop system............ 43
Saving coal in power-plants......41 to 45
Saving Daylight, here and abroad...... 24
Saving gasoline on Sundays.......... 50

Subject *Page*
Saving in clay products industry...... 46
Saving of light and power........41 to 45
Saving power and light in factories..41, 42
Ships, best coal for bunkering......... 12
Ships bunkered on "Heatless Days".... 22
Skip-stop system effective............ 43
South Africa, coal reserves........... 26
Speakers tour mining fields........... 15
Staff of Fuel Administration....... 58, 59
State Administrators, powers.......55, 56
State Fuel Administrators............ 54
States, rank of, in coal production..... 28
Steam, coal used in making........... 39
Steam-heaters, how to run............ 34
Steam-power development 39
Stimulation of production......14, 15, 16
Storage regulations 25
Storm windows, advisability of........ 33
Strikes settled by wage agreement...... 17
Sunday motoring suspended.......... 50
Supply of coal remaining in U. S. 27

Temperature needed in homes.......... 38
Terra cotta manufacturers curtailed.45, 46
Tile, manufacture of, restricted.....45, 46
Trade Commission, Federal, report of.. 6
Transmission systems, duplicate........ 44
Transportation saved by zone system... 19

United States, coal reserves........... 26
Use of available water power......... 43

Value of various woods as fuel......48, 49

Wage agreement settled strikes........ 17
War Needs Aided by "Heatless Days".. 22
Washington wage agreement.......... 17
Waste saved without curtailment..41 to 45
Water in air needed with furnace...... 34
Water-power as a coal saver.......... 40
Water-power, by groups of states...... 40
Water-power development 39
Water power, utilization of........... 43
Weather-strips, advisability of......... 33
Wholesale prices, how fixed........... 7
Wood as a coal substitute..........48, 49
World's coal production, by years...... 27
World's total coal reserves............ 26
Wrecking of French mines............ 21

Yachts, fuel for, cut off.............. 47

Zone system, bituminous............ 19

21513

END OF
TITLE